

**Rockwell/Allen-Bradley
ControlLogix****Module 1
Overview****Module Overview**

This module takes a fundamental approach to a ControlLogix system. It begins with an overview of the architecture and migrates into an introduction of RSLogix 5000, the programming environment. Students will learn how to setup communications to the PLC using RSLinx, download and upload projects, as well as determine the modes of the CPU.

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Lesson Design

Most lessons include the following sections:

Lesson Objectives: The main objectives or what the lesson, the instructor and the student will accomplish throughout the lesson.

Terminology: Most lessons have a glossary of important terms, which will be needed to understand concepts within the lesson.

The Main Lesson Body: Although this section does not have a header this is the main portion of the lesson, covering the required material.

Exercise: Gives the student the opportunity for hands-on practical experience.

Table of Icons



Your Turn
Exercise Questions



Warning



External Files Used



Files From Memory Stick



Ask Your Instructor for
Assistance If Needed



Information



Caution



Note



Bonus Questions



Attention

Lesson Objectives

This lesson is designed to introduce the student to the hardware and system components used in a typical ControlLogix system. The following hardware topics and components are covered in this lesson:

- System Overview
- Chassis & the ControlBus Backplane
- Power Supplies
- Logix 5000 Processors
- CompactLogix Processors
- Discrete and Analog I/O
- Communication Bridge Modules
- Motion Control Modules
- Software Overview

Terminology

Tag	A text based address
RTB	Removable Terminal Block, or the harness that plugs into most modules that interface with field devices
RIUP	Remove and Insert Under Power. All ControlLogix modules can be inserted or removed with power applied to the chassis.
DLR	Dual Level Ring, the term used to describe building an EtherNet/IP network as a ring.

Logix 5000 System Overview

The Logix 5000 architecture was designed to provide a single platform to cover the needs of many applications. Typical applications include the following:

- Sequential or traditional PLC control
- Modular communications including Gateway functionality
- Process control or traditional DCS control
- Drive System and Motion Control



The Logix 5000 platforms are known as a PAC, or Programmable Automation Controller. PAC is a “super” PLC or Programmable Logic Controller. These systems include the following features:

- Projects downloaded to the processor include configuration, logic, tags and data
- Very fast CPU processing for more advanced control algorithms
- Large memory capacities
- True multitasking with multiple processors in the chassis
- Pre-emptive multitasking within each processor
- Chassis are modular allowing placement of modules, including the processor, in any slot

The Logix 5000 systems include ControlLogix, CompactLogix, GuardLogix, DriveLogix and SoftLogix.



ControlLogix is Allen Bradley’s top of the line controller for high speed and multidiscipline control.



CompactLogix is a rackless based system for small to mid-sized machine-level control applications



GuardLogix is a safety rated processor used with ControlLogix hardware. The internal hardware in a safety PLC is redundant and performs diagnostics to ensure the performance of the safety function.

DriveLogix is a PowerFlex drive with an embedded Logix processor. SoftLogix is a virtual PLC running on a computer.

Much of what you learn in the ControlLogix course is applicable to all platforms.

Processors

At the heart of a ControlLogix or CompactLogix system are the controllers, features include:

- Text based addressing called tags instead of register based as in a SLC-500
- May use produced / consumed tags for controller to controller communications without ladder logic
- Allows multiple controllers in the chassis, facilitating application load sharing
- Instructions include the full PLC-5 instruction set and a complete set of logic motion instructions. Block transfer instructions can be performed using a MSG instruction, but are only required when using legacy remote I/O hardware
- Other programming languages such as:
 - Function Block Diagram (FBD)
 - Sequential Function Chart (SFC)
 - Structured Text (ST)

ControlLogix Processors

Early ControlLogix Processors

- 1756-L1 – The first ControlLogix processor was 7 times faster than a comparable PLC5 system. The memory in the processor was expandable. **The last firmware version for this processor is 13**
- 1756-L55 – This processor is 7 times faster than the original L1.
- No base memory is included, but memory modules are available up to 7.5 Mbytes. **The last firmware version for this processor is 16**



60 Series Processors

- The 1756-L6x processors are 2-3 times faster than a L55 processor.
- The processor memory is fixed, depending on the model the processor could have from 2 to 32MB of memory.
- CompactFlash is used for non-volatile memory
- **The last firmware version for this series of processors is 20**



70 Series Processors

- USB communication port
- On-board display providing enhanced controller diagnostics and run-time information
- SDRAM for non-volatile memory
- Energy storage module eliminates need for battery
- Double the amount of controller connections
- The processor memory is fixed, depending on the model, the processor can have from 2 to 32 MB of memory



80 Series Processors

- Requires Studio 5000 version 28 or higher
- USB communication port
- The 80 series processors add gigabit EtherNet ports to the processor
- The processor memory is fixed and depending on the model, the processor can have from 3 to 40 MB of memory



ControlLogix XT

- L73 based controller
- designed for extreme environments
- it has 8 MB memory



Armor ControlLogix Processors

- For on machine solutions, there is ControlLogix, GuardLogix, and CompactLogix versions available



Refer to the ControlLogix Selection Guide (Publication 1756-SG001) for further specifications



Current ControlLogix Processors

Cat. No.	Description	User Memory
1756-L81E	ControlLogix controller, 1 built-in USB port, single port EtherNet/IP	3 MB
1756-L82E		5 MB
1756-L83E		10 MB
1756-L84E		20 MB
1756-L85E		40 MB
1756-L71	ControlLogix controller, 1 built-in USB port	2 MB
1756-L72		4 MB
1756-L73		8 MB
1756-L74		16 MB
1756-L75		32 MB
1756-L73XT	ControlLogix-XT controller, extreme environment	8 MB
1756-L71S	GuardLogix safety controllers	2 MB standard 1 MB safety
1756-L72S		4 MB standard 2 MB safety
1756-L73S		8 MB standard 4 MB safety
1756-L7SP	GuardLogix safety partner (one is required for each GuardLogix L7 controller)	—
1756-L72EROM	Armor ControlLogix controllers, EtherNet/IP dual port	4 MB
1756-L72ERMOS	Armor GuardLogix controllers, EtherNet/IP dual port	4 MB standard 2 MB safety

GuardLogix Processor Features

GuardLogix processors add the ability to create the ESTOP string on a machine using IO on either DeviceNet, EtherNet/IP or ControlNet. The safety logic is contained in a periodic task. Variable speed drives and servo system may also have safety related options for safe limited speed or torque. Depending on the IO hardware used and how it is configured safety levels up to SIL 3 / PLe can be achieved.

Rockwell products that include safety are usually **RED**.



GuardLogix controllers can be purchased as an L6xS, L7xS and L8xES processor. The L7xS and L6xS require a 1756-LSP safety partner. This processor runs only the safety logic as a redundant check. These processors have all the same features and capabilities of standard processors. The L8xES series processor can be used without a safety partner (1756-L8SP) if only SIL 2 / PLd is required. SIL3 / PLe requires the safety partner to be installed.

Chassis and the ControlBus Backplane

The chassis used in ControlLogix systems come in several different sizes: 4, 7, 10, 13, and 17 slots. Series A chassis have a 10 amp backplane while the Series B supports 13 amps.

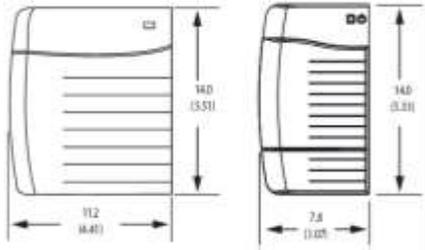
The backplane, which is part of the chassis, is called ControlBus. It operates as a mini network, fashioned after the communications platform ControlNet.



Power Supplies



Refer to the ControlLogix Power Supply Technical Guide (Publication 1756-TD005) for further specifications



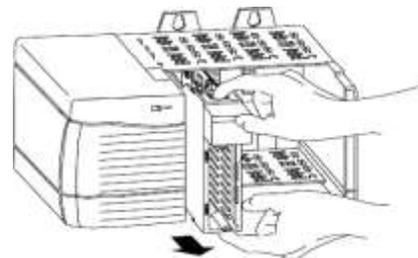
Every chassis requires a power supply that provides voltage down the backplane to the modules. There are several different power supplies available.

Standard AC Power Supplies	1756-PA50 (Slim), 1756-PA72, 1756-PA75/B
Standard DC Power Supplies	1756-PB50(Slim), 1756-PB72/C, 1756-PB75/B, 1756-PC75/B, 1756-PH75/B
XT Power Supplies	1756-PA30XT (Slim), 1756-PB30XT(Slim), 1756-PAXT, 1756-PBXT
Redundant Power Supplies	1756-PA75R/A, 1756-PAXTR, 1756-PB75R/A, 1756-PBXTR

There are also cables specific to redundant power supply installations, check the user manuals for more information.

RIUP

RIUP, or **Remove and Insert Under Power** is a feature of the ControlLogix system that allows modules to be removed from the chassis without powering down. From a hardware perspective, looking at the card edge; the connector shows two different sizes of pins. As the card is removed from the chassis the shorter pins, or the data lines are broken first; then the longer ones, the supply pins are disconnected. From a software perspective, RIUP is accomplished during the maintenance portion of the processor scan.



Warnings:



- 1) Removing modules while power is applied to the chassis may cause arcing. This may cause a safety concern in some environments.
- 2) If you remove a module required to control your process or machine – will it run properly?

Discrete/Digital I/O Modules

Discrete/Digital input modules read if a voltage is present or not for such things as buttons and switches. Discrete/Digital output modules turn terminals on or off to control devices such as lights and relays. These modules are available in a variety of configurations:

- AC and DC versions
- 8, 16, and 32 point densities
- Non-isolated, and individually isolated modules
- Diagnostics modules
- Electronic fusing
- Electronic keying

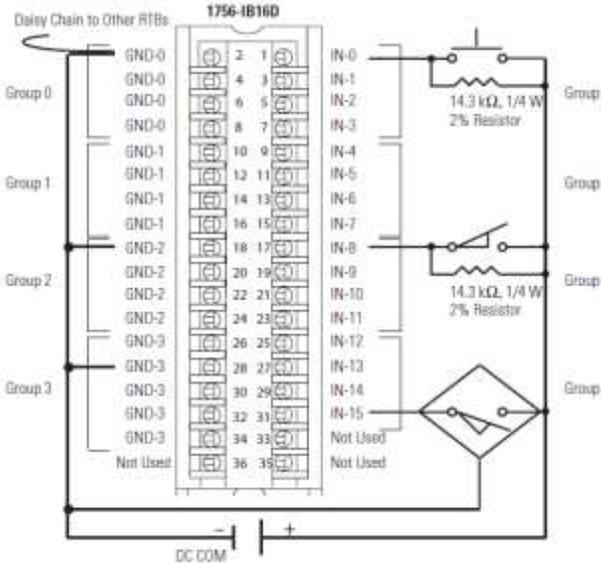


Diagnostic modules include:

- Electronic fusing on output cards
- Open wire detection on input cards
- No load and output verification on output modules

Diagnostics features (if available) can be configured on a per-terminal basis. Diagnostic bits can be latched on to trap intermittent faults. The latched diagnostic bits can be reset online, by the user, or by using a message instruction. Open wire diagnostics detection may require a resistor installed across field devices.

The wiring diagram below shows how an input module is wired.



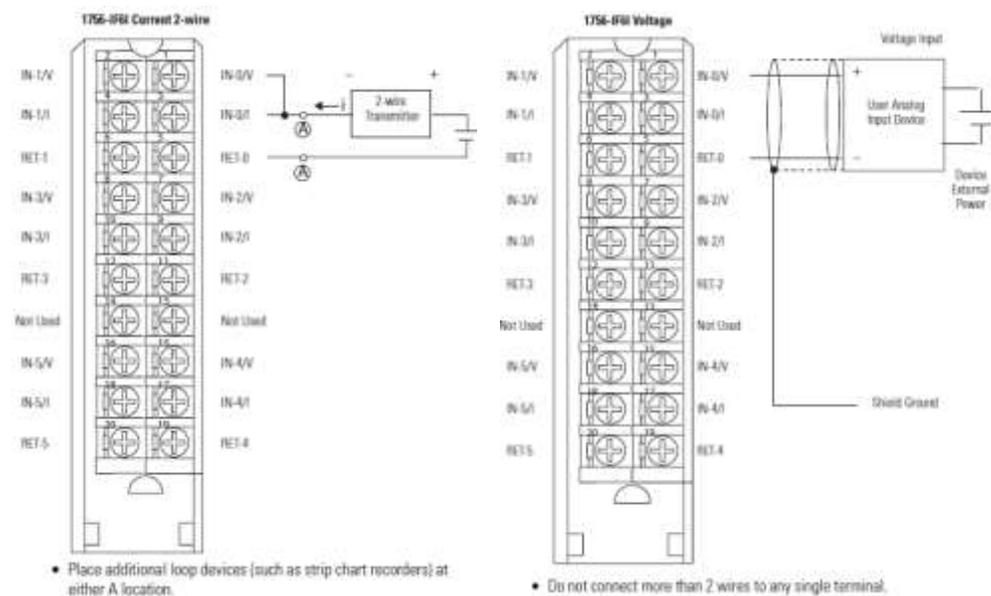
Analog I/O Modules

Analog input modules handle DC voltages (e.g. 0-10V) or current signals (4-20mA) from such devices as pressure transducers or flow meters. Analog output modules convert digital values into signals for instruments like a flow controller or valve positioner.

Features of Analog I/O cards include:

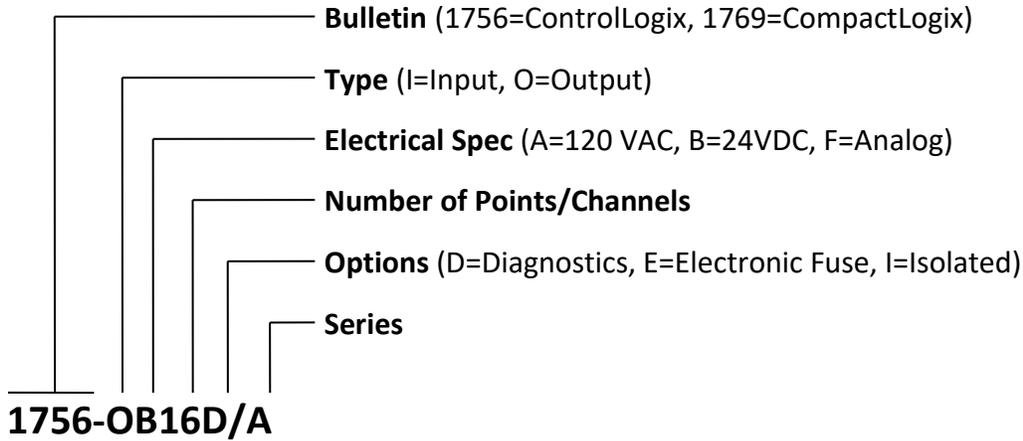
- Current and/or voltage capabilities
- Onboard scaling to engineering units
- Alarming on input modules
- Output clamping on output modules
- Integer or floating point data formats

Typical wiring for current or voltage inputs is shown below:



Catalog Numbers

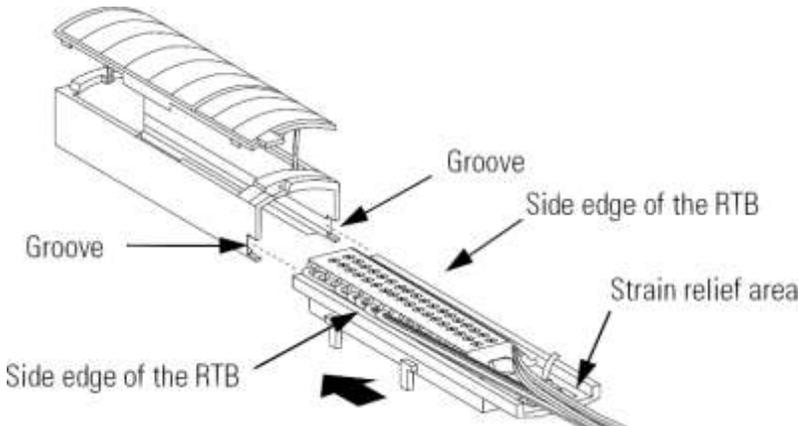
A catalog number for an I/O module has the following format:



Removable Terminal Blocks

Most discrete and analog I/O modules use RTBs, or Removable Terminal Blocks. Field devices are wired to the RTB, not the module, making it easier to swap out a faulty module. There are two pieces to an RTB, the terminal strip and the shroud. The shroud can be removed from the RTB to expose the terminal strip.

RTBs are not included with modules because they come in two main versions, screw clamp and spring clamp. Spring clamp versions are suggested for high vibration environments.



Each module equipped with an RTB has a plastic locking clip that can be set to one of two positions. In the up position, next to the picture of the open padlock the RTB can be removed without pulling the I/O module out of the chassis. In the down position, next to the picture of the closed padlock, pulling on the swing arm will pull the entire module out. Be sure to examine the locking clip before removing a swing arm.



Any communication card can be used to communicate to the processor for downloading, uploading and monitoring.

Communication Bridge Modules

Communication is no longer the responsibility of the processor module. This has been off loaded to communication modules. These modules are dedicated to a specific network protocol. The following network communication cards are available:

- DH+/RIO modules for legacy networks
- CNB modules for ControlNet
- DNB modules for DeviceNet
- EtherNet/IP modules

The name bridge module is actually fairly descriptive. These modules can provide a bridging or gateway function, which allows communications to bridge, or jump from one network to another without processor intervention.



Motion Control Modules

There are numerous motion control modules in the ControlLogix family:

- 1756-MO2AE, 2 Axis Analog Module
- 1756-MO3SE, 3 Axis Sercos Module
- 1756-MO8SE, 8 Axis Sercos Module
- 1756-MO16SE, 16 Axis Sercos Module
- Motion is also possible over EtherNet/IP starting at firmware version 21 (Studio 5000)

There are other modules available to include hydraulic motion. Motion is programmed with ladder instructions; no additional software is required in a motion system.

CompactLogix Hardware

The CompactLogix series of processors covers from small to mid-sized applications. They are typically meant to be used at the machine level.

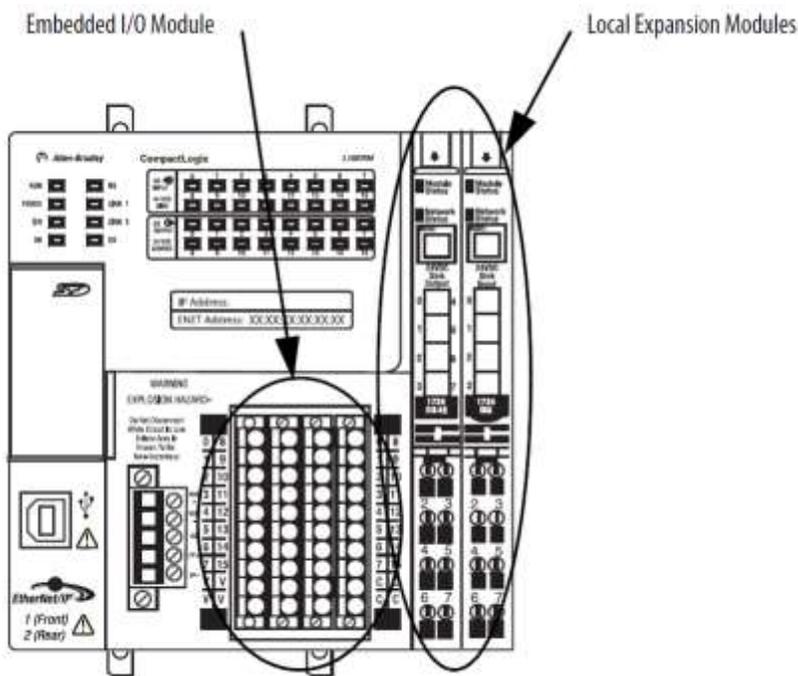
There are more controller choices for CompactLogix than there are for ControlLogix.

Current selections include:

5370-L1 systems include EtherNet/IP ports, USB port and support for local expansion modules. The local expansion is via 1734 POINT IO family IO modules.



Refer to the CompactLogix Selection Guide (1769-SG001N-EN-P) and the Technical Manual (1769-TD005) for more detailed specifications



Characteristic	1769-L16ER	1769-L18ER	1769-L18ERM	1769-L19ER
User Memory	384 KB	512 KB	512 KB	1 MB
Communication Ports	2 Ethernet, 1 USB			
Ethernet/IP Connections	4	8	8	8
Integrated Motion Axes	-	-	2	-
Module Expansion	6 1734 Modules	8 1734 Modules	8 1734 Modules	8 1734 Modules

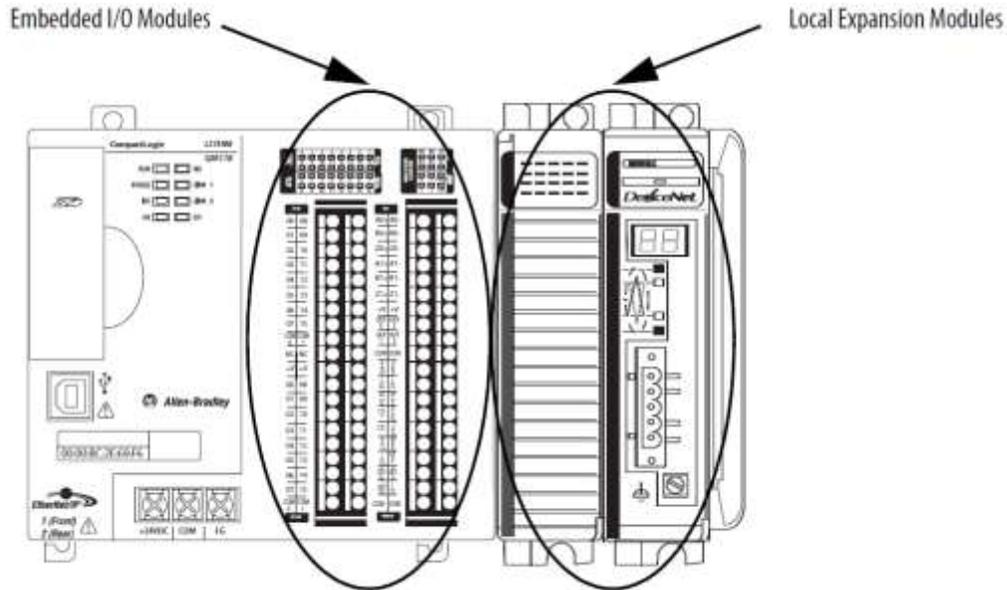


System Overview

5370-L2 systems include EtherNet/IP ports, USB port and support for local expansion modules. The local expansion is via 1769 family IO modules. The modules are placed to the right of the CPU and an end cap must be installed.



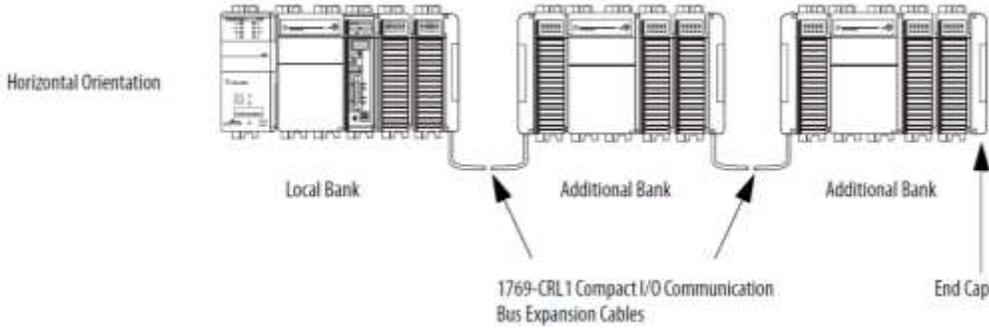
Refer to the CompactLogix Selection Guide (1769-SG001N-EN-P) and the Technical Specs (1769-TD005) for more detailed specifications



Characteristic	1769-L24ER-QB1B	1769-L24ER-QBFC1B	1769-L27ERM-QBFC1B
Available user memory	0.75 MB	0.75 MB	1 MB
Memory card	<ul style="list-style-type: none"> • 1784-SD1 (1 GB), shipped with controller • 1784-SD2 (2 GB) 		
Communication ports	<ul style="list-style-type: none"> • 2 EtherNet/IP • 1 USB 		
Embedded I/O	<ul style="list-style-type: none"> • 16 DC inputs • 16 DC outputs 	<ul style="list-style-type: none"> • 16 DC inputs • 16 DC outputs • 4 universal analog inputs • 2 universal analog outputs • 4 high-speed counters 	<ul style="list-style-type: none"> • 16 DC inputs • 16 DC outputs • 4 universal analog inputs • 2 universal analog outputs • 4 high-speed counters
EtherNet/IP connections	<ul style="list-style-type: none"> • 8 EtherNet/IP • 120 TCP 	<ul style="list-style-type: none"> • 8 EtherNet/IP • 120 TCP 	<ul style="list-style-type: none"> • 16 EtherNet/IP • 120 TCP
Integrated motion on an EtherNet/IP network	—	—	Supports up to 4 axes
Module expansion capacity	4 1769 modules		
Battery	None		
Embedded power supply	24V DC		



5370-L3 systems offer local expansion installed in up to three banks of modules. The modules may be arranged horizontally or vertically. 1769 IO modules are used with these controllers. The number of allowable local IO module varies with the controller used.



Refer to the CompactLogix Selection Guide (1769-SG001N-EN-P) and the Technical Specs (1769-TD005) for more detailed specifications

Standard 1756-L3 Processors

Characteristic	1769-L30ER(M)-(NSE)(S)	1769-L33ER(M)(S)	1769-L36ER(M)(S)	1769-L37ER(M)(S)	1756-L38ER(M)(S)
User Memory	1 MB	2 MB	3 MB	4 MB	5 MB
Safety Memory	500 KB (S)	1 MB (S)	1.5 MB (S)	1.5 MB (S)	1.5 MB (S)
Communication Ports	2 Ethernet, 1 USB				
Ethernet/IP Connections	16	32	48	64	80
Integrated Motion Axes	4 (M)	8 (M)	16 (M)	16 (M)	16 (M)
Module Expansion	8 1769 Modules	16 1769 Modules	30 1769 Modules	31 1769 Modules	31 1769 Modules



There are GuardLogix versions of the 5370-L3 processors as well. A second processor or safety partner is not needed.



5380 Controllers

These controllers are meant for mid-sized applications requiring high speed communications and up to 32 axis of motion control.

Catalog Number	User Memory	Safety Memory	Ethernet/IP Nodes	Integrated Motion Axes	I/O Expansion
5069-L306ER(M)(S2)	0.6 MB	0.3 MB (S2)	16	2	8
5069-L310ER(M)(S2)	1 MB	0.5 MB (S2)	24	4	8
5069-L320ER(M)(S2)	2 MB	1 MB (S2)	40	8	16
5069-L330ER(M)(S2)	3 MB	1.5 MB (S2)	50 / 60 v31	16	16 (31 >v29)
5069-L340ER(M)(S2)	4 MB	2 MB (S2)	55 / 90 v31	20	31
5069-L350ERM(S2)	5 MB	2.5 MB (S2)	60 / 120 v31	24	31
5069-L380ERM(S2)	8 MB	4 MB (S2)	70 / 150 v31	28	31
5069-L3100ERM(S2)	10 MB	5 MB (S2)	80 / 180 v31	32	31

5480 Controllers

This controller also contains a windows 10 IOT (Internet of Things) desktop. It has direct access to the standard Logix processor.

- Ideal for mid-size to large applications requiring high performance control and data throughput
- Enables high-speed I/O, motion control, and Device Level Ring/Linear topologies
- Includes three GbE Ethernet/IP ports that enable high-speed communications, I/O, and motion control (two are configurable, and support Dual IP address or Device Level Ring)
- Includes one GbE Ethernet port as a dedicated commercial OS network interface
- Supports up to 31 local 5069 Compact I/O modules



CompactLogix Additional Capabilities

If the model name of the processor includes an “M” such as L18ERM, the processor can use EtherNet/IP based motion. The number of axis supported will vary per the processor specifications.

If the model name of the processor includes an “R” such as L18ER, the processor supports DLR

There are safety versions of some of the CompactLogix processors, just like the ControlLogix processor, there will be a ‘S’ in the model name.

Software Packages

To program, configure, and maintain a ControlLogix system you will need the following software packages:

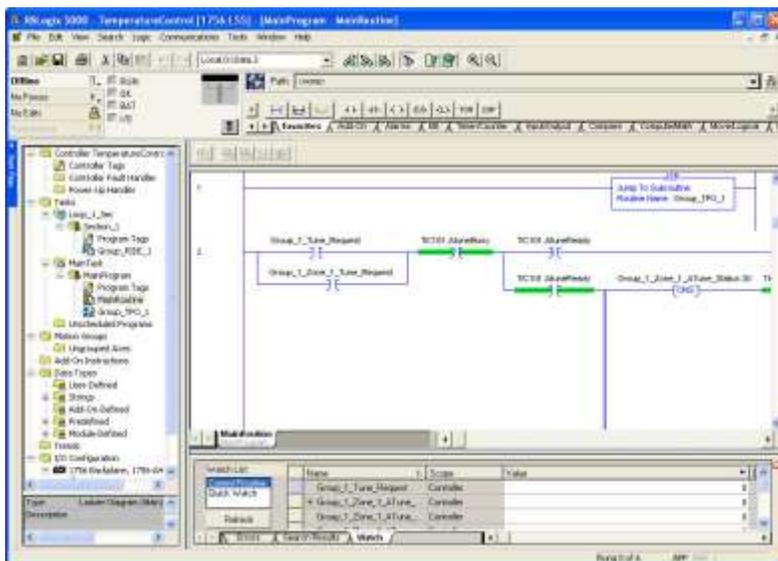
- RSLogix 5000 / Studio 5000 – The main programming and configuration package. With release of version 21, RSLogix was renamed to Studio 5000 Logix Designer. There are different bundles of this software: Standard, Professional, Full, Lite, Mini and Service which come with different features.
- RSLinx – Communication software
- ControlFlash – Firmware updating tool
- RSNetworkx for CNET / DNET – Network configuration package if your system includes a ControlNet or a DeviceNet network



Refer to the ControlLogix Selection Guide (Publication 1756-SG001) for different editions and Windows compatibility.

RSLogix / Studio 5000

RSLogix 5000 is used to create, modify and troubleshoot ControlLogix projects.



There are a number of versions available depending on the hardware platform used and the programming languages selected.

- Version 10 and later releases includes the Control Flash software package
- Software registration keys are required to run all RSLogix 5000 packages
- Prior to version 10 only one release could be installed on a computer, or more accurately on a hard drive partition
- Version 10 allows multiple future release installations and one backwards release installation
- As of version 21, RSLogix 5000 has been renamed Studio 5000

RSLinx

RSLinx is communication software. RSLinx provides a means for software packages running on a computer to talk via its drivers to nodes on a network.

ControlFlash and Revisions

Each module in the ControlLogix family contains firmware, which is “burned” into the module using the ControlFlash software package. Upgradeable firmware allows module designers an extremely fast method to update, change or fix features in a module. Registered and **in support** RSLogix users may download firmware from the internet.



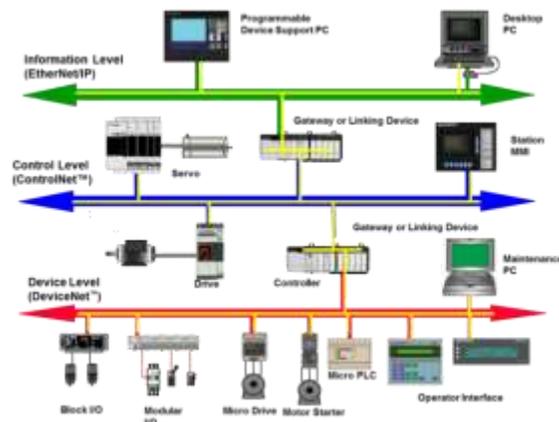
Warning! When flashing the firmware of any module allow the process to complete. Use a reliable, fast driver to flash modules. (Flashing a processor using the serial port will take 45 minutes: Flashing via 100 Megabit Ethernet will take 30 seconds)

There are several ways to determine the firmware revision of a module:

- Check the firmware sticker on the side of the module. This method is unreliable, as it only indicates what revision firmware the module shipped with at time of purchase
- Use an existing RSLinx driver to access the ControlLogix chassis. Right click on a module and select Device Properties
- Use any web browser to connect to an existing Ethernet module in the chassis. ControlLogix Ethernet modules have HTML code built in to the firmware, allowing users to access hardware information across a network.

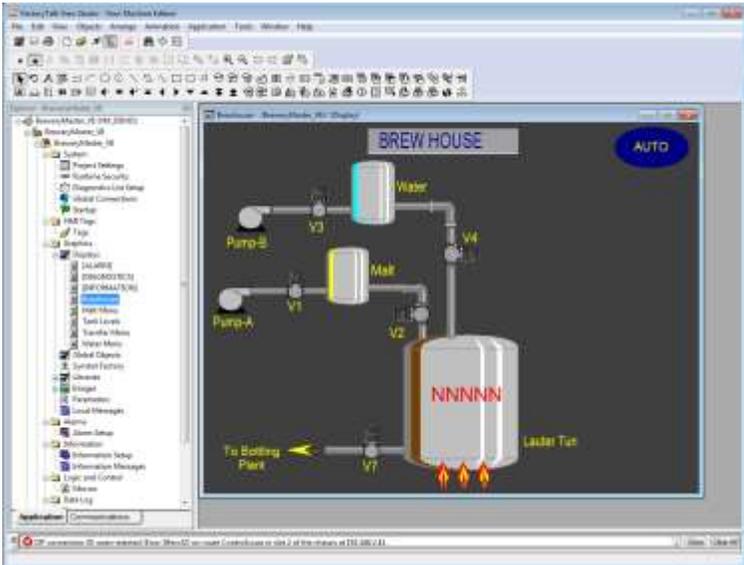
RSNetworkx for ControlNet / DeviceNet

RSNetworkx is available in multiple versions; one for ControlNet and one for DeviceNet. These are software packages used to build and configure ControlNet and DeviceNet networks. They are available at an additional cost. There is also a version of RSNetworkx for EtherNet/IP – it is a diagnostic tool only.



HMI Software / Hardware

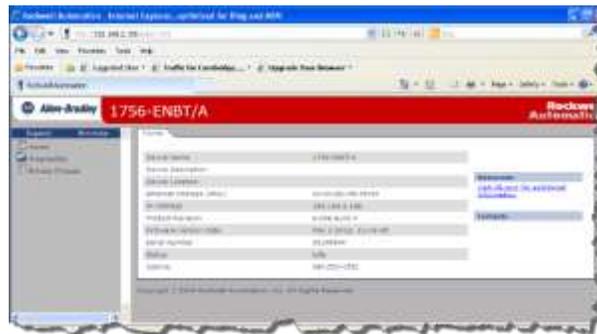
Rockwell's HMI offerings are FactoryTalk View ME and SE. The ME package is to develop applications for PanelView Plus hardware and runtime software. The SE package is a full SCADA package for large machine / plant monitoring. A screen capture of the ME display editor is shown below.



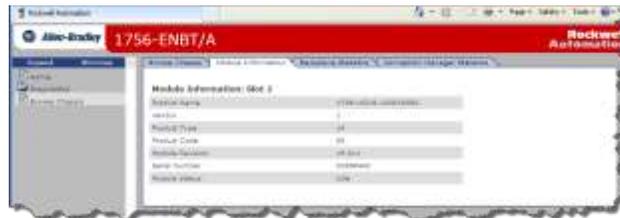


Your Turn # 1 – The Demo

- 1) Identify the CPU model in your demo unit. _____
- 2) Examine the front of the EtherNet/IP module. It should be located in slot 6 of the chassis. The window on the top of the module will have a number scrolling across it with a format like 192.168.2.xx This is the IP or Internet Protocol address that has been assigned to the communications module. Record your IP address: _____
- 3) Launch a web browser, and type in the IP address of your demo unit



- 4) Select Browse Chassis (or Chassis Who for older versions) and double click on the processor module. What revision is the module? _____



- 5) Check the revision level for all the modules and record the correct firmware

This can also be done using RSLinx. You will be doing this later in the class.

Lesson Objectives

This lesson will introduce you to RSLogix 5000, the programming environment used for ControlLogix systems. The following topics are covered in this lesson:

- Software overview
- Menus
- Toolbars
- RSLogix 5000 configuration

Terminology

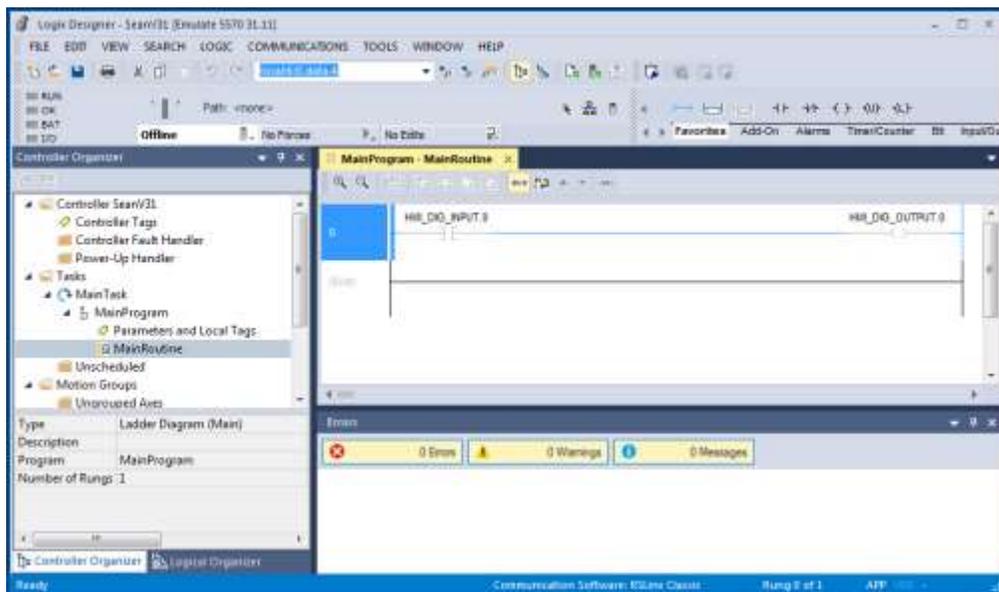
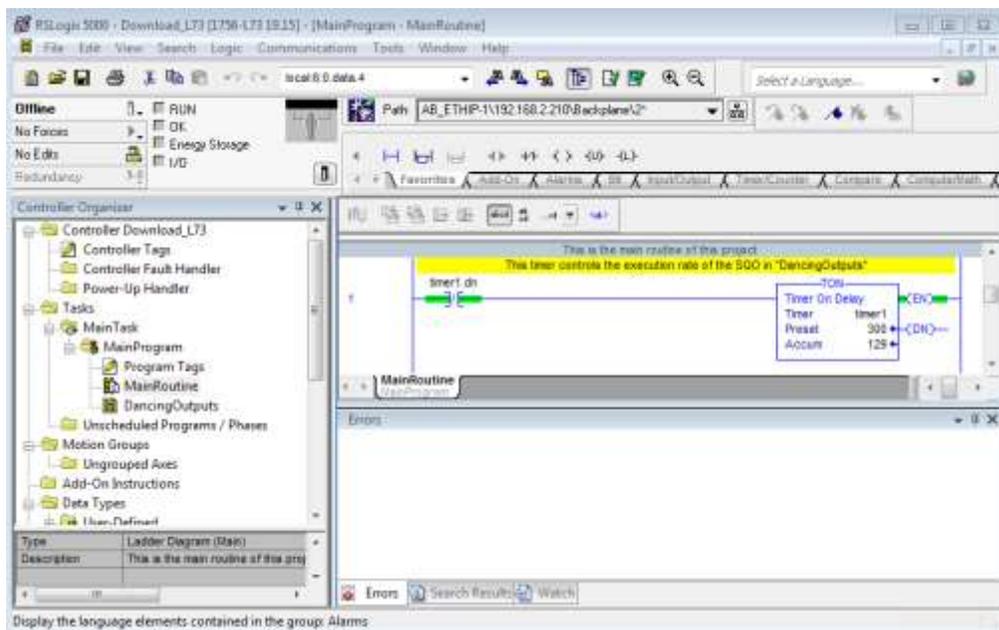
- Toolbars** A collection of icons that are grouped in line to provide shortcuts to specific functions.
- Tooltips** Tooltips are part of the help structure of any windows program and are displayed when you position the cursor over a toolbar icon.
- Project** A project is a file created by RSLogix 5000 and saved on the hard drive of the computer.
- Logix Designer** Starting with release 21 of RSLogix 5000, Rockwell renamed the RSLogix 5000 as Studio 5000 Logix Designer.



RSLogix 5000 Overview

RSLogix 5000 software is the main programming environment for the ControlLogix family of products. RSLogix 5000 is a Windows based software package which complies with standard Windows conventions, including the following features:

- Drop menus
- Toolbars
- Sub windows
- Tool tips
- Explorer style project organizer
- Drag n' Drop, Cut – Copy – Paste

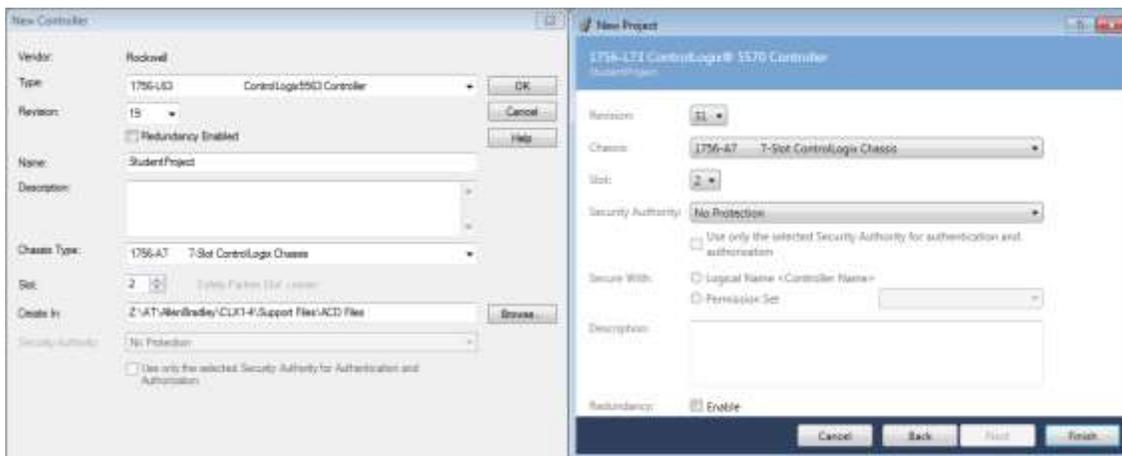


Working with Projects

When you first launch a session of RSLogix 5000, the main environment opens without a project loaded. To open an existing project select **Open** from the **File** menu. Keep in mind that only one project can be running in one session of RSLogix 5000. If your intention is to cut – copy – paste from another project you must launch a second session of RSLogix 5000.

The Quick Start page was introduced in version 16 provided easier access to projects and help files.

To create a new project, select the **File > New** menu item. This dialog box will appear.



The following attributes must be configured when creating a new project:

Type - Select the part number of the processor you will be using.

Revision - Select the firmware revision of the processor.

Name - This name will be stored in processor memory when you download the project. It is also used for hard disk operations.

Description - Documentation stored with the project on the hard disk.

Chassis Size - Select the size of chassis you will be using.

Slot - The slot number where the processor will be installed.

Create In - Defines where on the hard disk to store the project.

The default directory for projects created with the RSLogix 5000 software depends on what operating system is being used. With RSLogix 500 the default is C:\RSLogix 5000\. With Studio 500 the default is MyDocuments\Studio 500\Projects. The defaults may be changed under the Tools / Option Menu.

RSLogix 5000 – File Structure

An RSLogix 5000 project can appear on the hard disk with any of the following extensions:

- test.**ACD**: This is the main file extension or file type that can be directly opened with RSLogix 5000. It contains all project databases including the program logic, data, tags and descriptions.
- test.**L5K**: ACD files can be saved with the L5K extension using the **File > Save As** menu item. L5K files are stored in ASCII and typically offer a 40 to 1 compression ratio, reducing space required for file archiving. An L5K file cannot be directly opened by the RSLogix 5000 software. It must be converted by the software into ACD format first.
- test.**L5X**: XML file, may be used to import / export rungs, routines and tags.
- test.**SEM**: SEM and WRK files are created by RSLogix 5000 whenever you open a project. When you close a project the two files are deleted, the files are temporary working files. If Windows or RSLogix 5000 shuts down abnormally, most or all of your work will be recoverable.
- test.**WRK**:

Main Menu

The main menu structure of RSLogix 5000 reveals features that resemble many Windows based products. For example, every Windows based program has file related commands to create, open and save projects. Pulling down the File menu in RSLogix 5000 also shows many other File type commands.

These include:

New Component - Allows the programmer an easy way to add new components into the project. The individual selections will be explained in further lessons.

Compact - Over time the project databases will become fragmented much like the hard drive of a computer. The Compact selection will clean up the database.

Page Setup...

Generate Report...

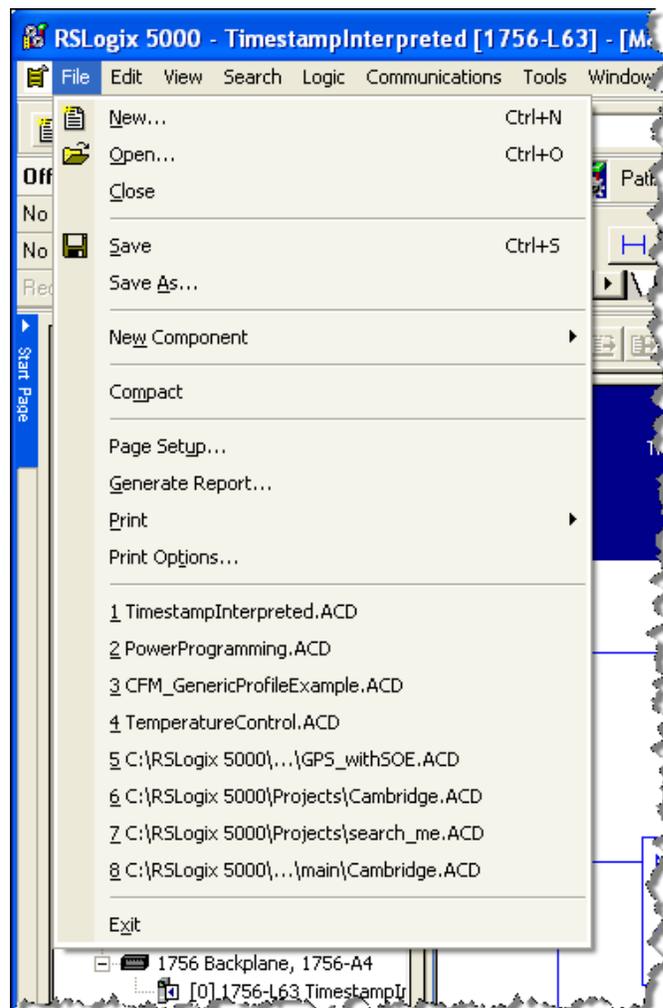
Print

Print Options...

All components of the project can be printed in different formats.

Project Links

A list of the most recently opened projects.

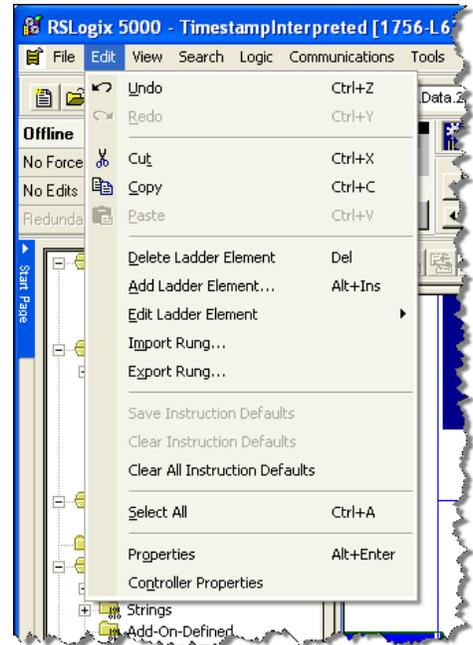


Edit Menu

The Edit menu in RSLogix 5000 contains many features found in standard Windows applications. These include:

- Undo – Redo
- Cut – Copy – Paste
- Ladder Element Editing
- Select All
- Properties

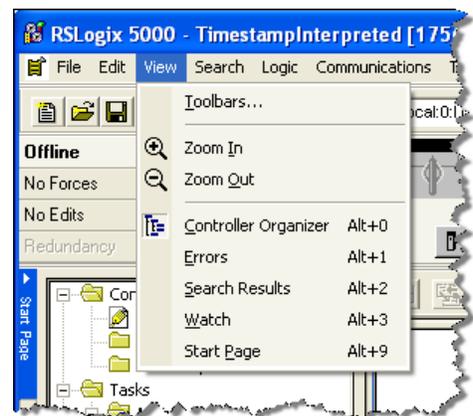
Most of the items in the Edit pull-down menu are also accessible using hot keys. For example, Control-C, Control-X and Control-V can be used to copy, cut and paste.



View Menu

The View pull down menu can be used to modify the appearance of RSLogix 5000. The user can turn Toolbars on or off, customize Toolbars, Zoom in or out of the Language Editor display and hide/display the Results window and Controller Organizer.

RSLogix 5000 allows the user to select which Toolbars are to be displayed, and allows some degree of Toolbar customization. Toolbars can be customized by selecting **Toolbars** under the View menu. When you select either the Language Element or Ladder Common the Customize button will be accessible.



Custom Menus

Several of the menus in RSLogix 5000 are custom menus that include features that are specifically for RSLogix 5000. These menus will be presented briefly here, as they will be covered fully in subsequent lessons.

These include:

- | | |
|---------------|--|
| Search | Search contains the main search engine, allowing the user to find a variety of data and text throughout the project. |
| Logic | This menu gives the user access to the Tag Database, the Force function, and several other specialized features of the RSLogix |

5000 software. Tools for Online editing are available in this menu, but most users prefer to use icons that are located on the desktop.

Communications This menu allows users to **Go Online** to a controller, **Upload** a project from a controller into computer RAM, or **Download** an open project to a controller. It is important to realize that the software “remembers” the last controller it was communicating with, so selecting any of the choices above could result in undesirable operation. Instead, use the **Who Active** command to select a controller.

RSLogix 5000 cannot communicate directly with real-world hardware. It uses RSLinx software to upload, download or go online. RSLinx should be considered the “conduit” between most software packages and hardware devices. RSLinx will automatically launch when any communication request like **Who Active** is selected.

Tools Menu

The tools menu within RSLogix 5000 contains a combination of many features including the following:

Options Allow the user to customize the display.

Security Security settings can be applied to a project if it is being used in conjunction with the RS Security Server. If you do apply settings while a project is open this selection will allow you to refresh these settings.

Translate PLC5 / SLC RSLogix 5000 has the ability to translate PLC5 and SLC500 projects into ControlLogix5000 projects. The translation process requires some intermediate steps.

Import and Export Tags This utility allows the user to import or export tags to and from the tag database. The utility uses the common CSV file format. Once exported, users can modify tags using third party software such as Microsoft Excel, and then import the modified tag database back into a project.

Motion Direct Commands This dialog box allows you to directly manipulate the motors of a Sercos or Analog servo system.

Optional tools can be installed which will be listed at the bottom. Some of the more common items are:

- **ControlFlash** – Used to update the firmware.
- **BootP-DHCP Server** – To assign IP address to Ethernet devices.
- **Compare Tool** – For finding the differences between two projects.

Window Menu

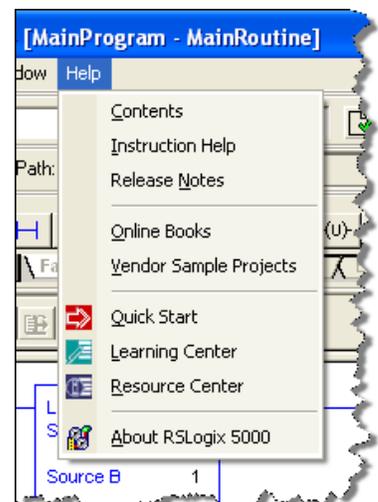
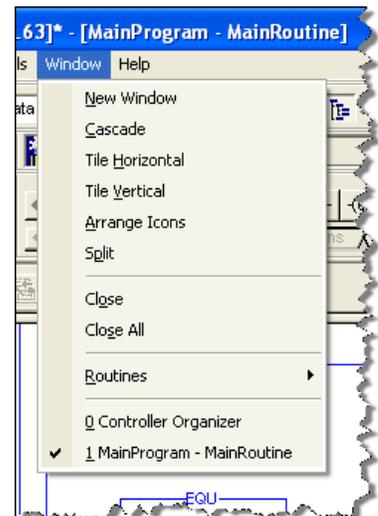
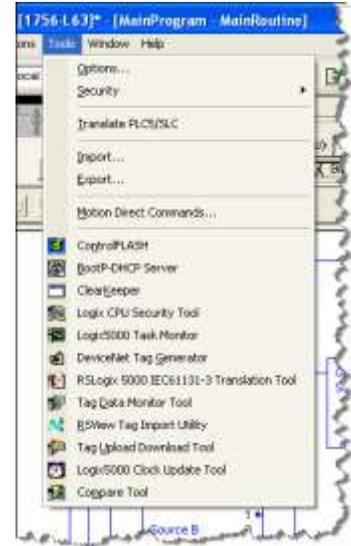
Traditionally the Window menu in most Windows based products provides a means for the user to easily work with several open projects. RSLogix 5000 can only open one project at a time, so the Window menu works a bit differently.

The top six selections allow manipulation of the various open windows by lining them up differently on the screen.

A useful tool under this menu is the **Split** function, which allows the user to split the ladder window into two sections. Unfortunately the split function does not allow two separate routines to be loaded within the one split window. To edit between routines load them into separate sub windows by using **New Window** and then tile them.

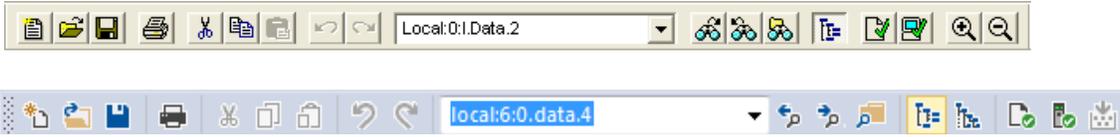
Help Menu

The Help menu provides on-line help. Releases after 16 the help is context sensitive. The standard Windows Help button is **F1**, it is a keystroke worth remembering! Links are also provided for manuals and sample projects.



Toolbars Included in RSLogix 5000

Standard Toolbar



The standard toolbar is the first toolbar at the top of the screen and includes features like file operations, searching, and routine verification.

As a general tip, the instruction toolbar can be re-sized by dragging the edge of the toolbar with your mouse. Be careful how small you re-size this. If re-sized too small the icons on the toolbar will be hidden and it will be difficult to decipher them.



Online Toolbar



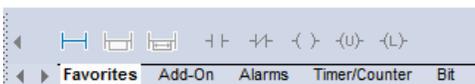
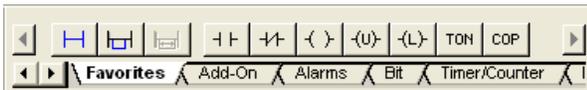
The Online toolbar is similar to the original “Classic Online Toolbar”, which can still be accessed by selecting Classic Online on the **View > Toolbar** menu. The Online toolbar allows users to Go Online, Upload, Download, Enable Forces and check for Online edits. As a rule, it is safer and more predictable to select **Communications**, then **Who Active** for any communication operations.

Path Toolbar



Originally included with the Online toolbar, the path toolbar provides a reference to the communications path used by this project. This path is set once a user goes online to a system. Pulling down the menu arrow at the end of this toolbar allows access to the list of “past used” paths.

Language Element Toolbar



This instruction toolbar provides easy access to the ControlLogix instruction set. Instructions are grouped according to their particular function. When editing function block programs this toolbar changes to the function block instruction set.



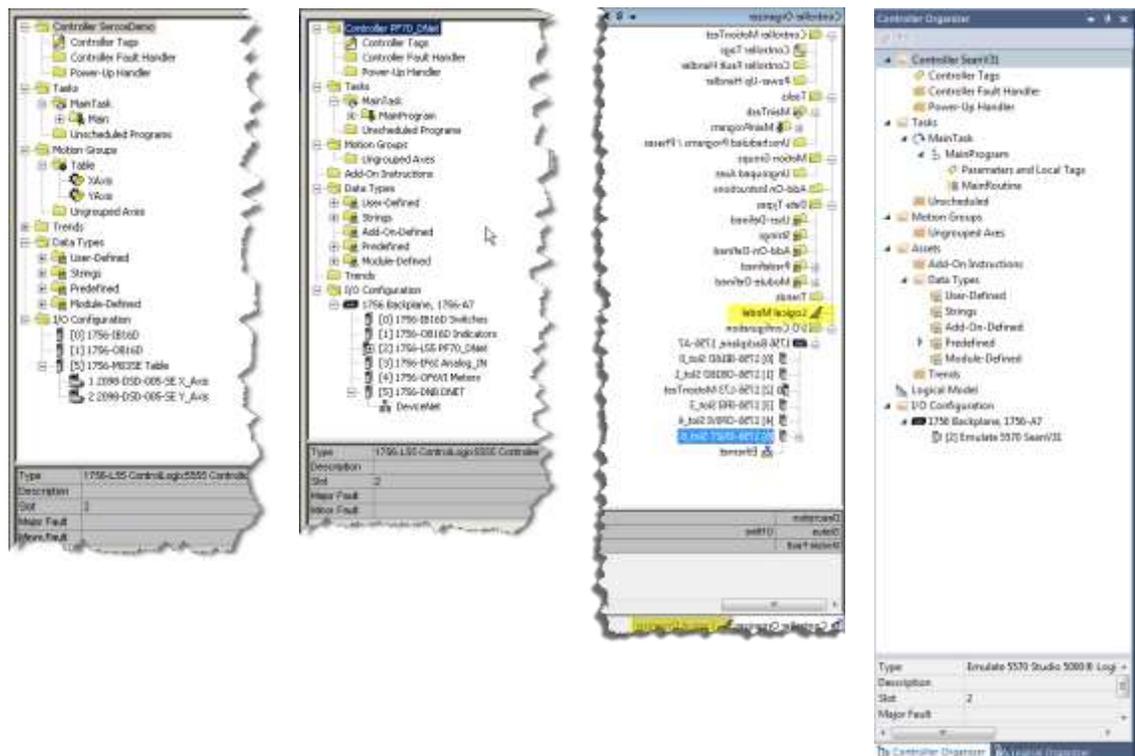
Controller Organizer

The Controller Organizer appears on the left side of an RSLogix 5000 project and is modeled after Windows Explorer. Any folder with a plus (+) sign contains sub-folders and can be expanded by clicking on the plus sign. In a similar fashion; folders with a minus sign (-) can be collapsed by clicking on the minus sign. A stand-alone folder or icon can be opened using the double-click method.

Each folder gives the user access to a different section of the project. A summary of some of the more relevant folders is given below:

- **Tasks Folder** – Contains Tasks, Programs and Routines that are used to break user entered code into sections
- **Motion Groups** – Contain configuration information related to motion control code
- **Data Types** – Contain predefined, user defined and module defined data types available or in use by the project
- **I/O Configuration** - Contains a list of the I/O and Communication modules being accessed by the controller

The format of the organizer changed slightly at revision 15. The graphic on the left below shows the organizer at revision 13, the one in the middle is Rev19, the one on the right is revision 24. In the earlier revisions the local chassis and processor were not displayed in the I/O configuration. The Studio versions added a Logical view, that does not display the I/O configuration, just the program structure.

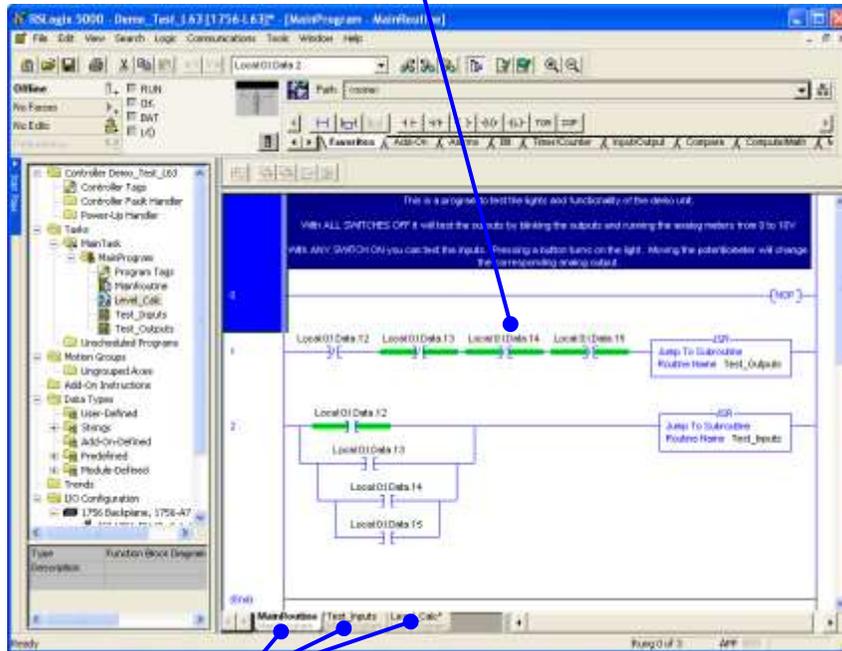


Main Window

The Main Window serves two purposes. The first is to display a routine for monitoring and or editing. The second function is to allow access to the tag database.

Each of the views provides several sub-functions. In the case of routines, the window can show the programming environment for the language being used.

Main Window showing Ladder Logic

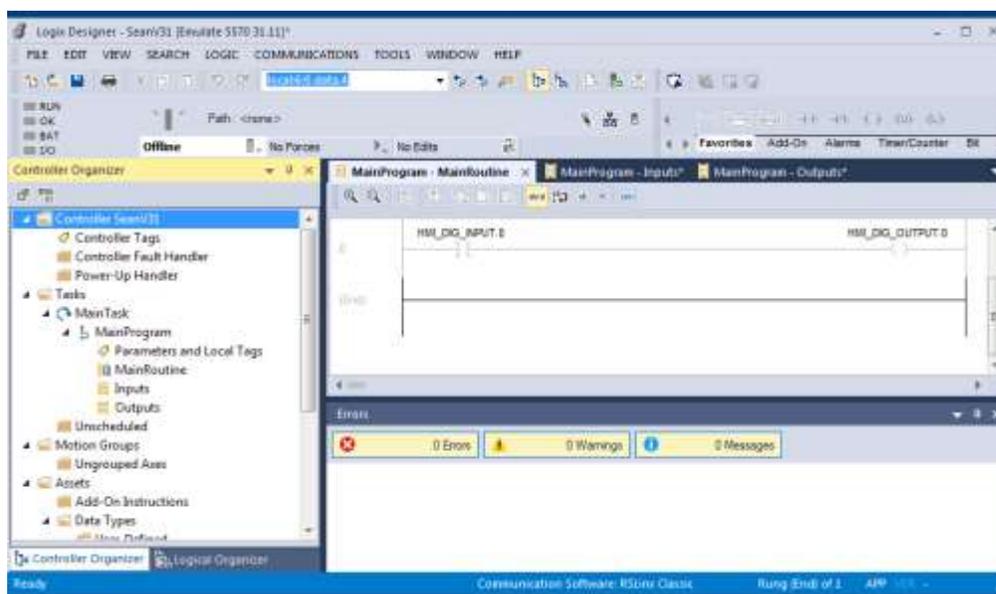


Open Routine Tabs



NOTE that the branches shown on rung 2 were entered incorrectly.

Can you describe what was done incorrectly?

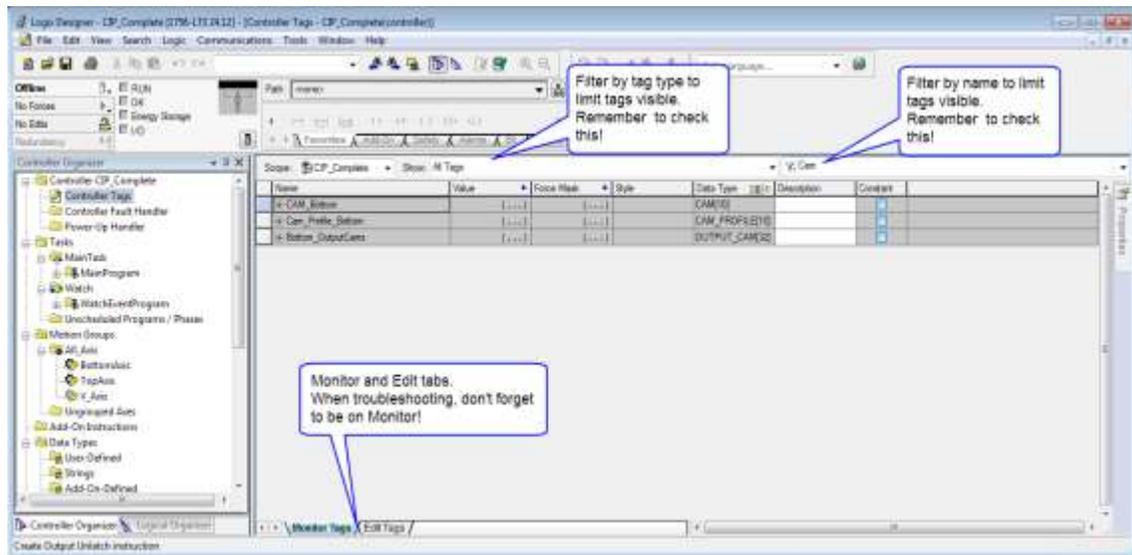


V31 made a massive visual change to the software.

RSLogix/Studio 5000 Overview

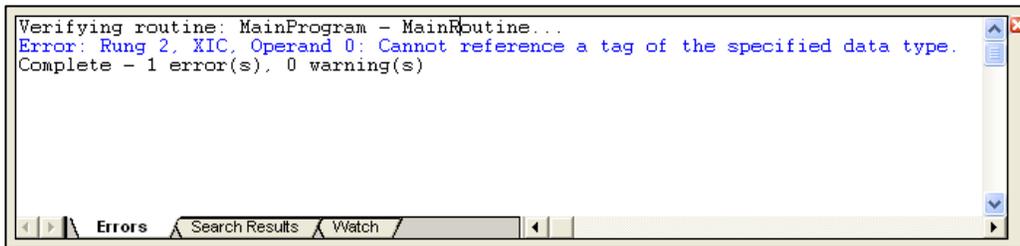
When displaying the tag database, the user can edit tags or monitor tags by selecting the appropriate tab at the bottom of the display. The Edit tab allows users to create new tags or modify existing tags (offline), while the Monitor tab allows users to monitor or change the value of a tag.

There are also different filters available to limit the tags visible by type or by name. The filter by name is not available on all revisions of RSLogix / Studio 5000.



Output Window

The Output Window has three tabs at the bottom for Errors, Search Results and Watch.



For errors or searching you can click (or double click) on the line to go directly to the location.

This window allows you to view and identify the following:

Errors

This tab displays the result of the last operation performed, and any errors that occurred. Learn to check this carefully. Just because you told the system to perform a download does not mean it was successful!

Search

This tab lists the results of the last search operation performed. If you have performed a "Find All"; you may have to use the scroll bars to view all the results.

Watch

This tab may be used two ways:

- To view all the tags in the current routine or
- To create a custom list of the tags to monitor. The watch cannot be saved with software versions below 18.

Short Cut Key Strokes

Delete	Delete the character after the caret
Enter	Edit the current field
Esc	Cancel the current action, including a mouse drag
Right or Left arrow	Open or close the current folder (+ or - folder toggle) in the Controller organizer, or navigate to the left or right in the various editors or browsers
Space	Display context-sensitive menus (same as a right mouse click) in the Controller Organizer
Tab	Advance the cursor forward through a dialog's fields or buttons
Up or Down arrow	Navigate up and down in the various editors or browsers
F1	Help – Context sensitive
F2	Edit the current field
F3	Find the next search result
F4	Navigate to the next error in the Output window's error list. A useful trick is to hide the Output window, to reclaim the screen real estate it takes, and to use F4 to navigate through the errors.
F6	Toggle between ladder editor panes
Alt + `	Access drop-down browsers or editors
Alt + F	Locate the cursor on the File option on the main menu
Alt + E	Locate the cursor on the Edit option on the main menu
Alt + V	Locate the cursor on the View option on the main menu
Alt + S	Locate the cursor on the Search option on the main menu
Alt + L	Locate the cursor on the Logic option on the main menu
Alt + C	Locate the cursor on the Communications option on the main menu
Alt + T	Locate the cursor on the Tools option on the main menu
Alt + W	Locate the cursor on the Window option on the main menu
Alt + H	Locate the cursor on the Help option on the main menu
Alt + Enter	Display the properties for the active routine
Alt + Insert	Display the appropriate Add Language Element dialog
Alt + Tab	Switch between all running applications
Alt + -	Accesses the Control menu for a child window from which you can move or resize the dialog
Alt + Space	Accesses the Logix Designer application's Control menu
Alt + Drag1	move a copy of the value to another field or a copy of an object in the Controller Organizer
Alt + 0	Toggle the Controller Organizer window
Alt + 1	Toggle the Output window

Alt + F4	Close the application in focus
Ctrl + Enter	Apply modifications to element comment in the Ladder Editor and the tag description in the Tag Editor
Ctrl + PageDown	Move to the next tab in a dialog or routine window
Ctrl + PageUp	Move to the previous tab in a dialog or routine window
Ctrl + Tab	Move between multiple views (for example, Ladder Editor, Tag Editor)
Ctrl + Drag1	Move a copy of the value, or of an object in the Controller Organizer, to another field
Ctrl + C	Perform a copy
Ctrl + D	Edit a description
Ctrl + E	Navigate to cross reference
Ctrl + F	Display the Find dialog
Ctrl + G	Display the Go To dialog
Ctrl + H	Display the Replace dialog
Ctrl + I	Toggle between insert and append modes
Ctrl + N	Create a new controller
Ctrl + O	Open a controller
Ctrl + P	Access the Print dialog
Ctrl + R	Insert a rung
Ctrl + S	Save a controller
Ctrl + T	Toggle the bit
Ctrl + V	Perform a paste
Ctrl + W	Access the New Tag dialog, from which you can add a new tag
Ctrl + X	Cut
Ctrl + Y	Redo
Ctrl + Z	Undo
Ctrl + F4	Close window with focus
Ctrl + F6	Toggle between multiple views (for example, Ladder Editor, Tag Editor)
Shift + Tab	Move the cursor backward through a dialog's fields or buttons
Shift + F3	Find the previous search result
Shift + F4	Navigate to the location in which the previous error occurred in the ladder, or navigate to the previous error in the Output window's error list
Shift + F10	Display context-sensitive menus (this is the same as a right mouse click)
Shift + Ctrl + Tab	Move between multiple views in the opposite direction from Ctrl+Tab





Your Turn

- 1) Start RSLogix 5000 and spend a few moments exploring each of the pull-down menus. Familiarize yourself with the contents of each.
- 2) From the view menu, select toolbars, experiment turning various toolbars on and off. Note the command button to set the toolbars back to the default state.
- 3) From **View menu**, select toolbars and then the Restore Factory Toolbar layout, then enable the Bookmark toolbar.



- 4) From the **Tools** menu, select options and explore the various options that can be modified. NOTE that you can change the default text size for the editors as well as the colors. The number of backups and save time interval is also adjustable. There is a reset for each category.
- 5) Create a new project; name it <yourname>_"today's date": **Tom_Aug_1**
 - a) Configure the processor model number, slot location and chassis size to match your student demo unit and save your work.
- 6) Use File, Save As to save your file with the L5K extension.
 - a) Launch Windows Explorer and open the default folder.
 - b) Check the file size of the two versions of the project; the L5K file should be much smaller.
 - c) Close Explorer.
- 7) Using the Help menu, identify which versions of RSLogix 5000 software are installed on your computer. List them here:



- 8) Open the project named "Project_1" from the support files. Answer the following questions:
 - a) What model CPU is used? _____
 - b) What slot is it located in? _____
 - c) What size chassis is used? _____
 - d) What firmware version is it? _____

Lesson Objectives

After the completion of this lesson, you will be able to:

- Configure the DF1 Driver
- Configure the Ethernet driver
- Configure the EtherNet/IP driver

Terminology

Driver A small sub program defining the configurations settings required for a software program running on a computer to talk to a controller via some network.



What is RSLinx?



RSLinx is a software package that allows software on a computer to communicate with hardware in the real world. It can be thought of as the “conduit” between software and hardware. It is server software.

RSLinx provides the following services:

- RSLinx allows some software running on a computer . . .
- To talk via its drivers out some port of the computer . . .
- Via some network . . .
- Out to some hardware

The above statements are purposely ambiguous because RSLinx defines all the aspects of communication. When configuring drivers you decide which port you want to use, and which network.

RSLinx can be configured to communicate with a ControlLogix processor using the following protocols:

- RS-232 Driver using a serial connection
- Ethernet or EtherNet/IP
- ControlNet
- DeviceNet
- Data Highway Plus

The serial connection will provide point-to-point connection directly to a processor. All other network options must be routed through their respective communications bridge modules.

RSLinx may be run as a service under Windows or as an application. When RSLogix 5000 needs to communicate, it will launch RSLinx automatically. RSLinx will run in the background indicated by a small icon in the taskbar as shown below.

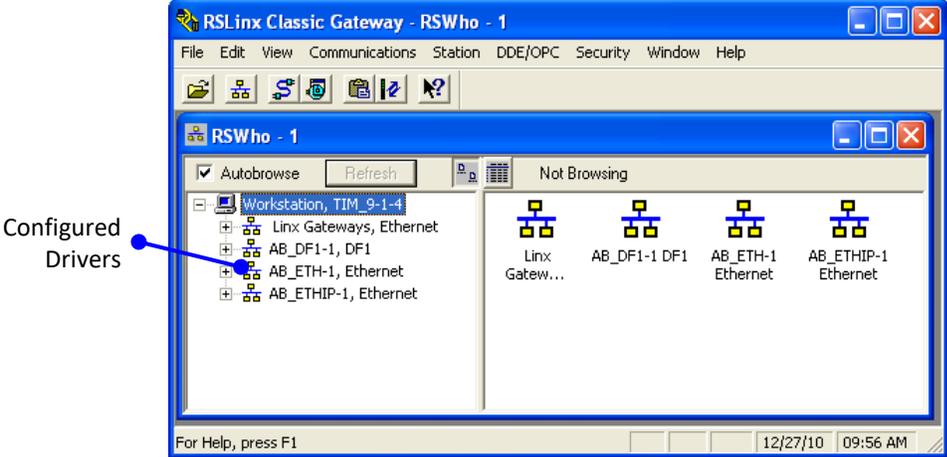


● RSLinx running as a service in the taskbar

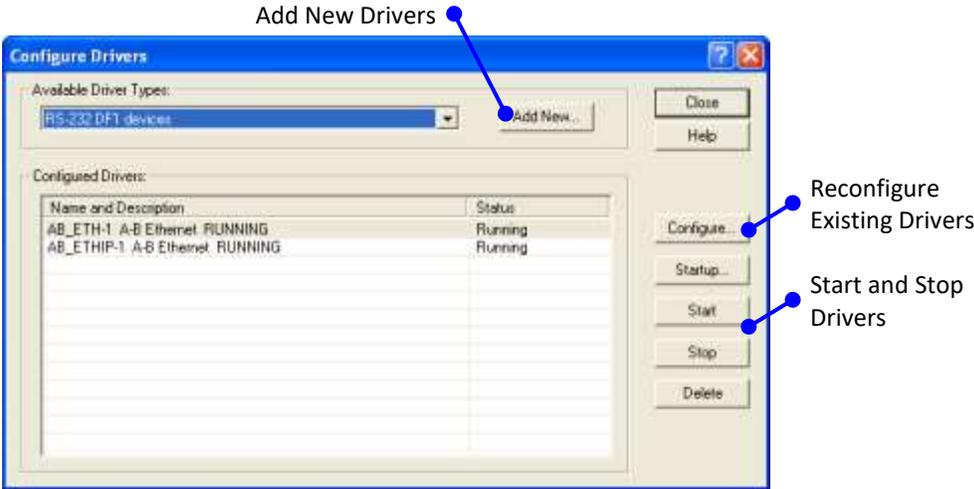
RSLinx Drivers

With the RSLinx window in focus, selecting the **Communications** pull down menu gives the user access to the **RWho** and **Configure Drivers** features.

When RWho is selected, a window launches; in the left pane all existing drivers will be displayed. By expanding a driver in the left pane, nodes accessible on the associated network will be displayed in the right hand pane.



The **Configure Drivers** menu displays drivers that have previously been configured and their status. The combo box at the top allows you to add additional drivers. If there is a port conflict; then a driver can be stopped to release the port for other software to use it. However, a driver must be started and running in order for any Allen Bradley software use it.



Not all the drivers listed are used for ControlLogix since RSLinx supports all Allen-Bradley products.

You can add the same type of driver multiple times by giving it a different name and parameters.

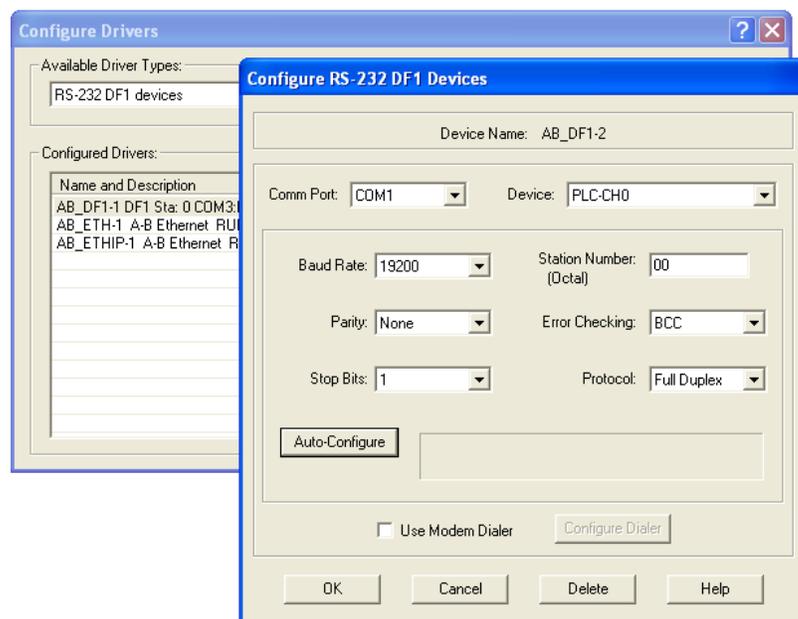


RS-232 DF1 Devices Driver

This is almost the “universal driver”; communications may be established with almost every Allen Bradley device using this driver. To set this up you need:

- An available serial port on your computer. If none is available you can use a USB to serial port converter.
- A serial cable. With ControlLogix, use a 9 pin female to female null modem cable.

With the communication cable connected, from the **Communication** menu, select configure drivers, then select the **RS-232 DF1 devices driver**, and **Add New**. The configuration screen shown below will appear. Click on the Auto-Configure command button. The software will attempt to learn the required communication parameters.

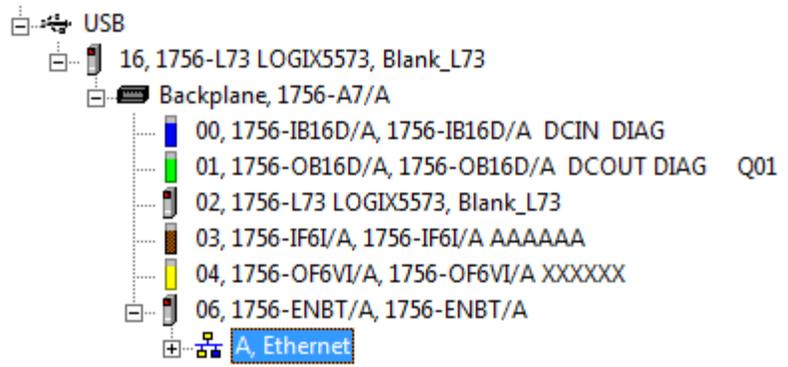


If the auto configure is unsuccessful, one of the following is most likely the cause:

- The wrong cable has been used
- The cable is not plugged in
- The serial port computer is in use
- Note that not all USB to serial port converter are compatible with RSLinx.

USB Driver

Rockwell has started to eliminate RS-232 ports on the CPUs and replace them with USB ports. The USB port may be used for programming and troubleshooting.



If the **computer** driver for a USB processor has not been installed, it may take a few minutes for the driver to be properly installed / loaded.

The first time you connect the PLC to your computer, the computer will automatically load the required driver. You may have to confirm the installation of the driver.

After the computer driver is loaded, RSLinx will automatically add the required RSLinx communication driver.

Once, the driver is configured, you should be able to perform an RSWho and view the PLC on the USB connection.

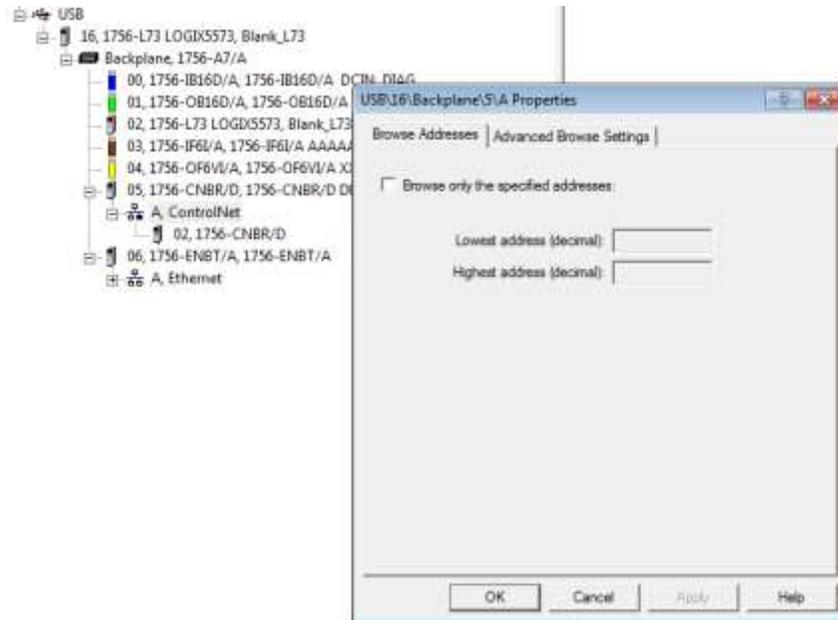
USB Pass Through to EtherNet/IP

When connected to the USB port; you can pass through the CPU/backplane/local Ethernet to access devices on Ethernet. **This is must be configured before it will work.**




Pass Through to ControlNet

You may also pass through to a ControlNet network and set its browsing range:

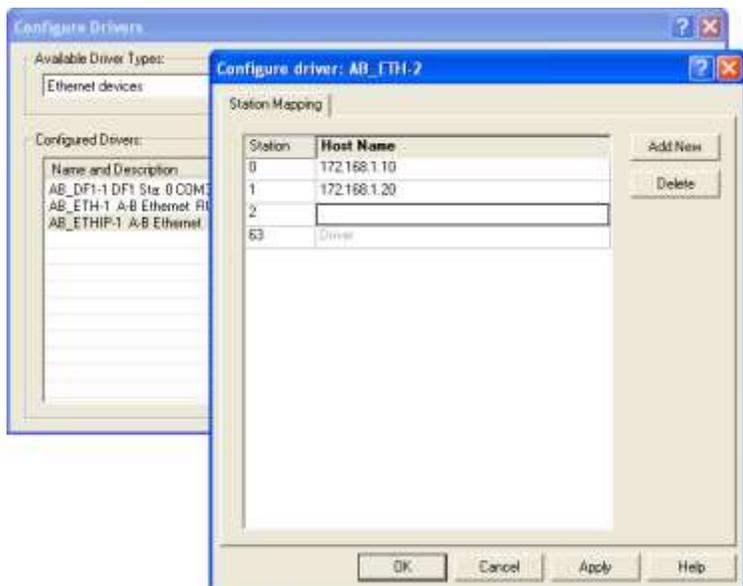


Ethernet Drivers

Ethernet is the most common type of driver used. There are two types of Ethernet drivers. The Ethernet driver is the older version that supports standard Ethernet devices including EtherNet/IP. The EtherNet/IP driver is newer, has extra features and supports only EtherNet/IP capable modules.

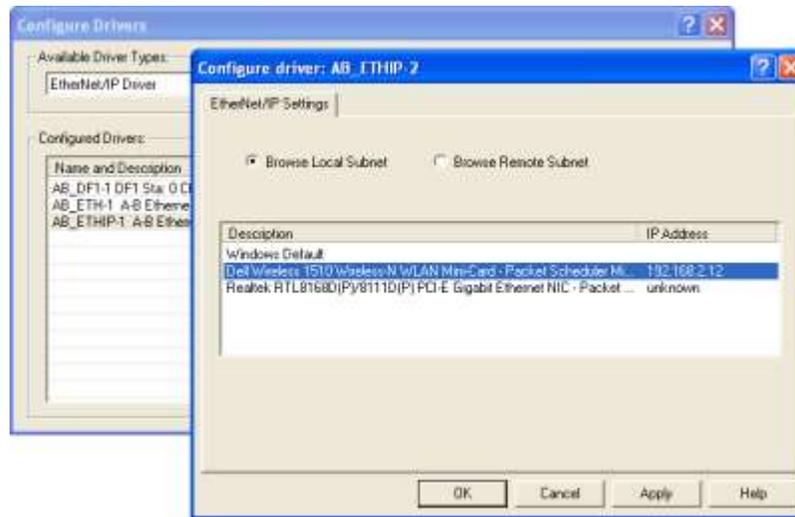
Ethernet Devices Driver

The Ethernet driver can be used to communicate with either Ethernet or EtherNet/IP modules. The catch is you have to know the IP address of the modules to configure it. This driver is handy if you wish to communicate with only select IP addresses. There is a maximum of 64 stations per driver.



EtherNet/IP Driver

EtherNet/IP is a special form of Ethernet used for industrial processes. The IP in this case stands for Industrial Protocol. For our purposes, it is only important to know that it can “self-discover” EtherNet/IP modules on the network it is browsing.



From the configure menu, select Browse Local Subnet and select the Ethernet port to use in the list below.

NOTE: this ability was added in later versions of RSLinx; otherwise, it uses the Windows default.



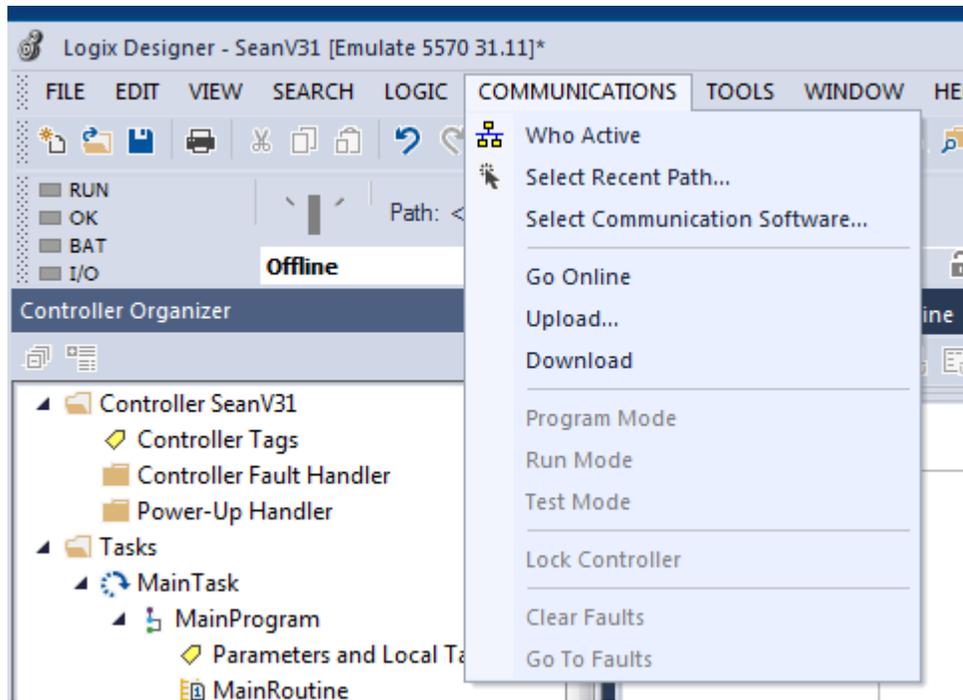
Virtual Backplane Driver

The virtual backplane driver allows communications to the USB port, SoftLogix or the Studio 5000 Emulator.

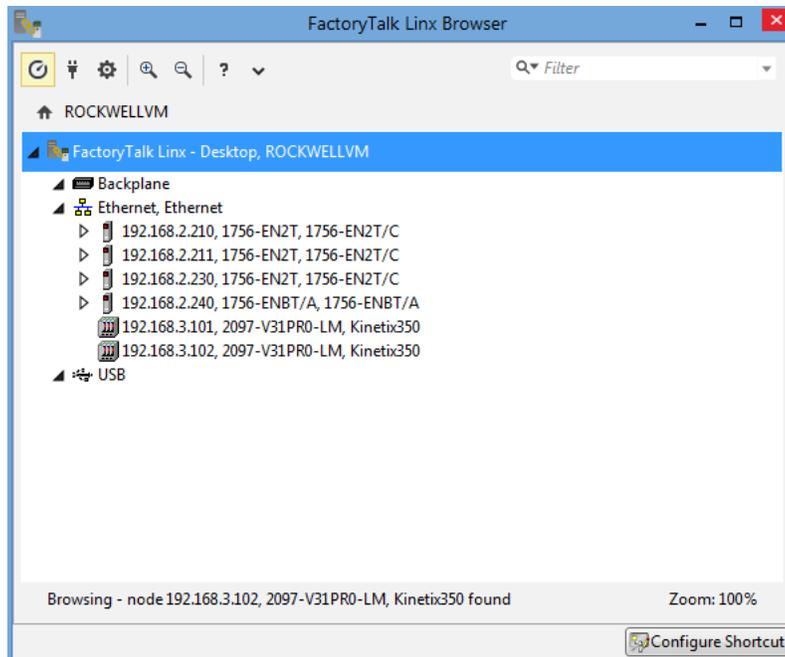


FactoryTalk Linx

As of version 31+ you can download using either RSLINX Classic, or FactoryTalk Linx. In Studio 5000 you must select the software you wish to use.

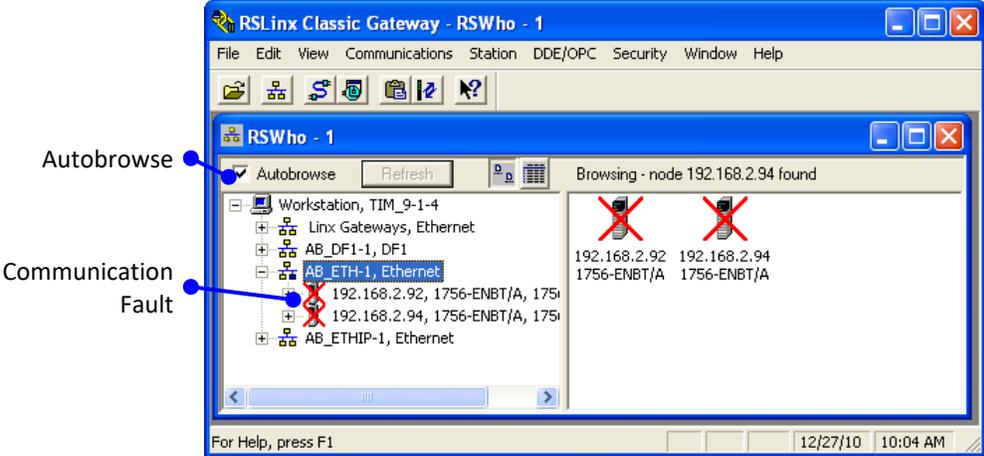


The newer version of FactoryTalk Linx comes with a browser that allows you to configure drivers separately from the FactoryTalk Studio software.



Checking Communications

To verify that communications are working correctly open RSWho in the Communications menu. Make sure the Autobrowse feature is checked, click on the driver (the top part of the driver tree must be selected), and the driver icon will animate while browsing for the configured devices.



Any drivers being browsed will not be able to be stopped or reconfigured.

After a timeout, if RSLinx cannot establish communications the device will display a red X on it. RSLinx also remembers devices that were once connected but may not be available at the moment. You can continue to expand the driver tree to see the chassis and modules.

Remember - If you cannot communicate with a PLC, it is not a problem with RSLogix software - if you can view the PLC in RSWho, you can communicate with it in RSLogix. The most likely causes of communication problems are:

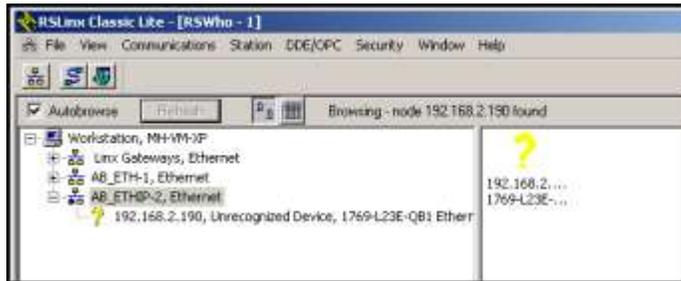


- DF1 Driver: Wrong COM port or cable.
- EtherNetIP Driver: Incorrect network settings in Windows.
- Ethernet Driver: Incorrect network settings in Windows.



EDS Files

As there is always new hardware or new versions of existing hardware released, it is possible that RSLinx cannot identify a device in RSWho. RSLinx displays a device it cannot identify with a yellow question mark.



The data required to identify new devices is stored in an EDS file (Electronic Data Sheets). In some cases if the EDS file is for an earlier version of a module, the module may be identified, but not fully functional within RSLinx.

EDS files can be downloaded from the AB web site. There is a utility program to register them. The software can be accessed from the RSLinx tools menu. A similar tool is available from within RSNetwork software.



Depending on the version of RSLinx on your computer and the device, you may also be able to upload the EDS file directly from the device.



Right click on the device in RSLinx and select "Upload EDS from Device". This will launch the EDS registration tool and register the EDS.



NOTE that you may have to register multiple EDS files for new hardware. For example, the L23E CPU requires two EDS files, one for the Ethernet interface and one for the CPU itself.





Your Turn

- 1) Start RSLinx if it is not running.
- 2) If RSWho is active in RSLinx, close it.
- 3) Select the Configure Driver option from the Communication menu.
- 4) Delete any existing drivers.
- 5) Makes sure there is an Ethernet cable connected from the computer to the Ethernet module.
 - a) Add the **EtherNet/IP Driver**.
 - b) Use RSWho to ensure that the EtherNet/IP driver is running. List the IP addresses of the ControlLogix demos.

 - c) Add the **Ethernet devices** driver to RSLinx. Configure it with the IP address of your demo station.
- 6) **Optional** – Depending on the equipment available, the instructor will let you know whether to do this step or not.
 - a) Connect the serial communication cable included with the computer. You will have to use a USB to serial converter. Remember to check which com port the USB adapter is using. Do this by right clicking on the Computer in the start menu and selecting properties and then Device Manager.
 - b) Add the **RS-232 DF1 devices** driver to RSLinx.
 - c) Set the Com Port to that assigned to the USB adapter, and then use the Auto Configure button to configure the serial parameters. **The RS-232 and USB adapter must be plugged in for this to work.**
 - d) Perform an “Auto-Configure” with the cable unplugged.
- 7) Add the virtual backplane driver. Set slot to 0”.



Lesson Objectives

After the completion of this lesson, the student will:

- Configure an Ethernet module using RSLinx
- Configure an Ethernet module using BOOTP

Terminology

MAC	Media Access Control. A unique address assigned to hardware devices on an Ethernet network.
DHCP	Short for Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network.
BootP	Bootstrap Protocol. A TCP/IP protocol used by nodes to obtain its IP address, server address, default gateway, and other network information.
IP	An Internet Protocol address (IP address) is a numerical label assigned to each device participating in a computer network. An IP address serves two principal functions: host or network interface identification and location addressing. The designers defined an IP address as a 32-bit number and this system, known as Internet Protocol Version 4 (IPv4). However, due to the enormous growth of the Internet and the predicted depletion of available addresses, a new version of IP (IPv6), using 128 bits for the address, was developed in 1995. IP addresses are binary numbers, but they are usually stored in text files and displayed in human-readable notations, such as 172.16.254.1 (for IPv4), and 2001:db8:0:1234:0:567:8:1 (for IPv6).
Subnet Mask	The subnet mask is used to determine where the network number in an IP address ends and the node number in an IP address starts.

General

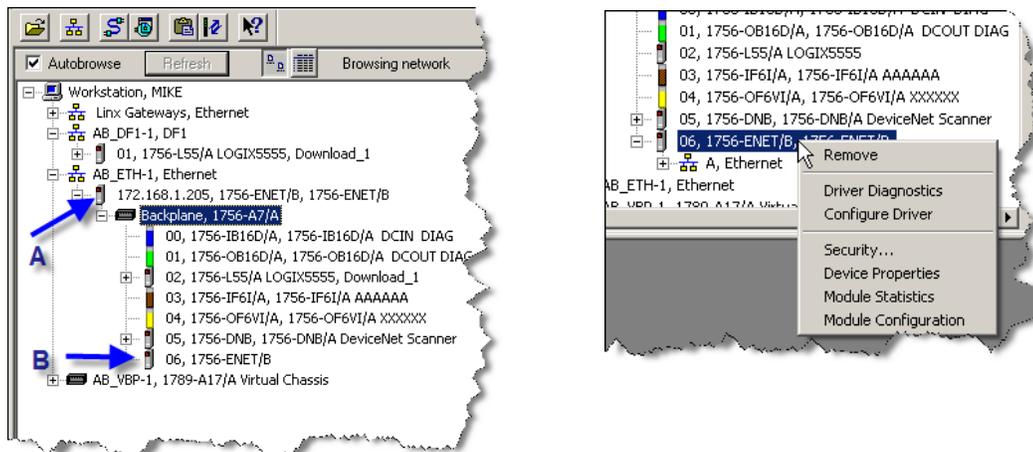
A brand new “factory fresh” Ethernet module does not have an IP address assigned to it. The module must be configured or assigned an IP address using one of two methods:

- 1) If there is an existing **working** path to the module, then RSLinx can be used to configure it. This would be the case if the module was in a chassis with a CPU. The RSLinx DF1 driver could then be used to assign the address.
- 2) If there is no valid path to the module, then a process called BOOTP or DHCP could be used. Rockwell Automation provides a BOOTP server software with the install of RSLogix 5000.

Configuring Through RSLinx

If a path exists to get to the module in RSLinx, either because there is another communication module in the chassis, or because the module already has an IP number, and all you wish to do is change it, the module may be accessed via RSLinx.

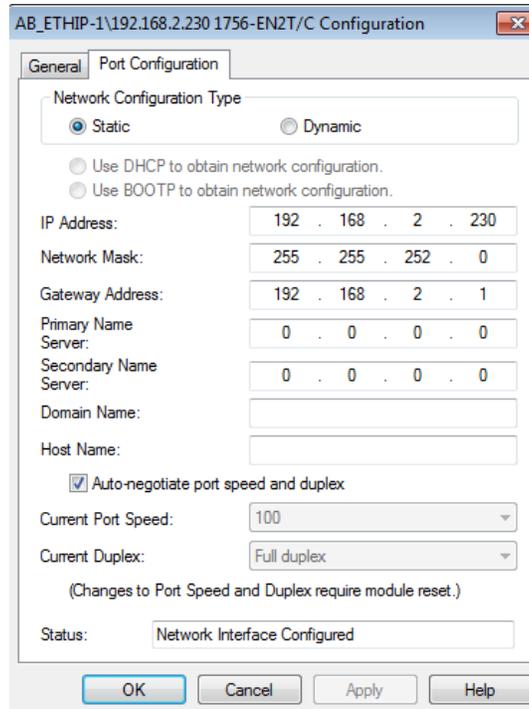
When configuring an Ethernet module with RSLinx, the module may appear in the RSWho screen multiple times. Only the first occurrence of the module in a tree can be used to configure the module. In the left diagram below, location A and B are the same module. Only A can be used to configure the module. Right click on the module as shown in the diagram below right and select module configuration.



The configuration screen is shown to the right. This one is for a 1756-ENET module. The screen is similar for other EtherNet modules.

As a minimum, you must set the IP address and the Subnet Mask. **These should be part of your system documentation / electrical prints for the machine.** Depending on your application, you may have to populate the other data fields.

Once you have made the changes, click on the Apply button. If you have changed the IP or sub net mask, you may lose communication to the module.



BootP/DHCP

If the module is in “out of the box” state and you cannot get access to the module through some other communication path, the way to go is to use Bootp or DHCP. Rockwell Automation includes a BootP/DHCP server with RSLogix 5000 software.

NOTE: A newer version of the utility has been renamed BOOTP-DCHP Tool.



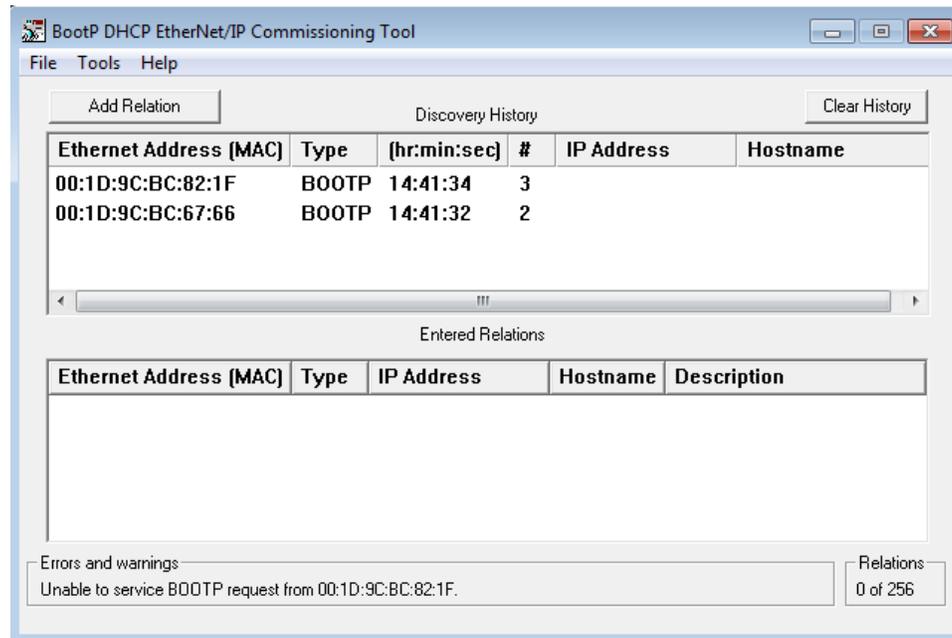
All devices on Ethernet have a MAC address, each device is unique. So no two devices should ever have the same MAC address. When BootP is being used, the module broadcasts its MAC address to all stations (multicast) requesting that a server respond with its IP address.

When a server receives the message; it looks up the MAC address to see if there is an entry in its database indicating what IP address corresponds to the MAC address broadcast. If there is an entry, the BootP server responds with a message instructing the device what its IP address should be. The module will then use that IP until the next time it is reset (cycle power), and then it will perform another BootP broadcast.

The DHCP process is similar. In this process, however, the MAC address is not used to assign the IP address. The module will broadcast a message requesting the DHCP server which will respond with the next available IP address from a list. The next time this same module boots up using DHCP, it could receive a different address from the server.

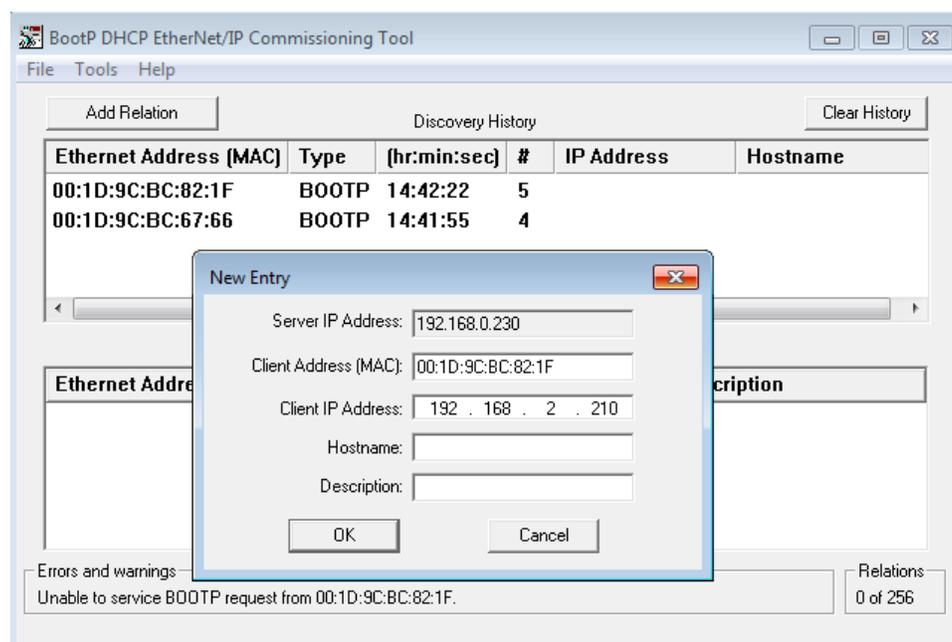
Configuring Ethernet Modules

The screen capture below shows the BootP / DHCP server receiving requests. It displays the time, the type and the MAC address.

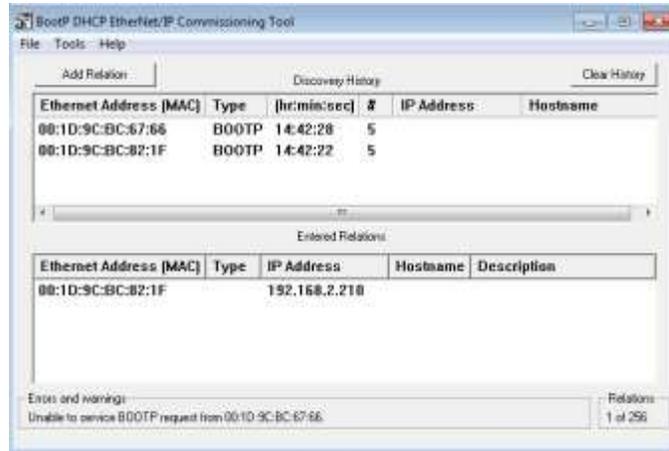


The relationship between the MAC address and the IP address has to be configured. This can be done by left clicking on the **New** button in the Relationship list or by double clicking on the device in the Request History window.

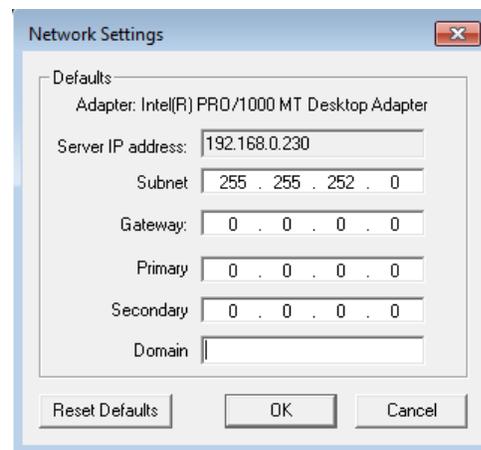
The screen below shows the dialog box that appears by double clicking on the device in the request history window. In this example, we are setting 172.168.1.205 to MAC address 00:00:BC:03:C9:6D.



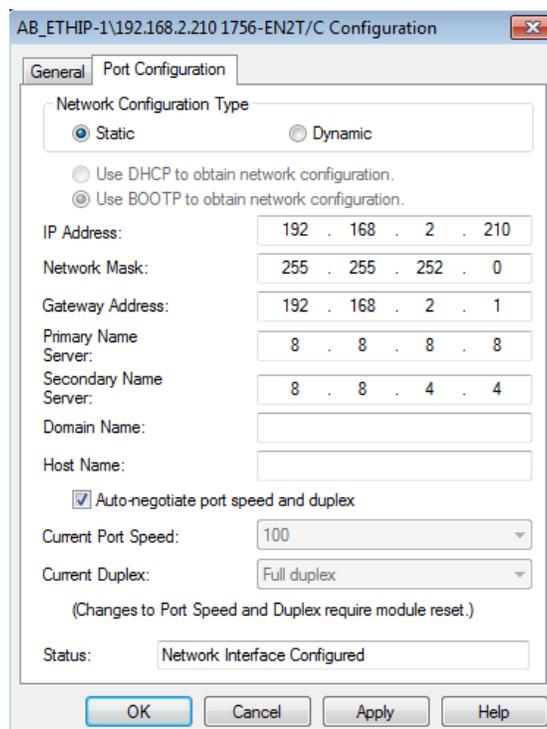
After clicking on OK, the next time the module does a BootP request, the server will respond with the configured IP address. See the next screen capture.



The BootP server software must be configured with the subnet mask. If a Gateway, DNS and Domain name are being used they must also be configured. This is done by selecting Network Settings from the Tools menu. **The first time the software is run, this dialog box will automatically appear.**



Now that the Ethernet module has an IP address, you may want to disable the BootP utility in the module. If the module experiences a power cycle with BootP enabled and the BootP software is not running, the module will not get an IP address. To prevent this, make the IP address static by disabling the BootP utility. This may be done in RSLinx (preferred) or in the BootP Utility.





Your Turn #1 – Changing the IP

- 1) Using RSLinx, change the IP address of the Ethernet module in your demo to be 10 higher than it is currently. **Check to be sure this does not result in an IP address conflict with another station.**
- 2) Using RSLinx set the IP address back at its original address.

Remember – If you are using the Ethernet driver in RSLinx, you will have to configure another entry in the driver to allow you to communicate to the module after you have changed its IP address. If you are using the DF1 or EtherNet/IP driver you will not have to make any changes to the driver.



Your Turn #2 - Using DHCP (Optional)

- 1) Use RSLinx to change the IP configuration of the PLC communication module to Bootp. Note the IP address of the unit: _____
- 2) Start the Bootp software on your computer.
- 3) Cycle power to the PLC demo, if you have an ENBT module, note the messages on the LED display. If you have an EN2T you will not need to cycle power.
- 4) Note the BootP message in the server software, double click on it and assign the IP address to what you wrote down in #1.
- 5) The device should receive its IP address, use RSLinx to confirm it is correct and set the device back to Static.

Lesson Objectives

After the completion of this lesson, the student will:

- Understand the operation modes available with the ControlLogix CPU
- Be able to change the mode of the CPU using either the key switch or RSLogix 5000 software



Processor Operating Modes

The key-switch on the ControlLogix processor has three positions.

RUN

In the Run position, the processor is actively controlling the machine/process. Online editing and downloads are not possible.

PROG (Program)

In the Program position, the processor does not scan the project. Input cards continue to write status to the processor. The machine/process is dormant.



Warning: Selecting Program mode does not guarantee that outputs will turn off. The state outputs enter when program mode is selected depends on the various card configurations.

REM (Remote)

By setting the key-switch in the Remote position, the processor operating mode can be changed via a programming terminal. Modes available are **Remote Run**, **Remote Program** and **Remote Test** mode.

Remote Test is used strictly for program debugging. The processor behaves as though it is in Remote Run mode, but all of the real world outputs are deactivated. Test mode may only be entered using RSLogix 5000 software.

There is a level of security provided by the key switch. When either Run or Program Mode is selected, selecting the appropriate mode and simply removing the key will inhibit others from inadvertently changing modes. Although it must be understood, that this by no means replaces any plant wide lockout procedure. Not only are the keys plentiful, and identical for every ControlLogix system, but they are also the same keys used in the SLC500 product line.

Online Toolbar

The Remote key-switch position allows the user to **remotely** switch between run and program via their computer. This functionality is provided by the online toolbar, once online, located near the top left of the RSLogix 5000 session.



This graphic shows:

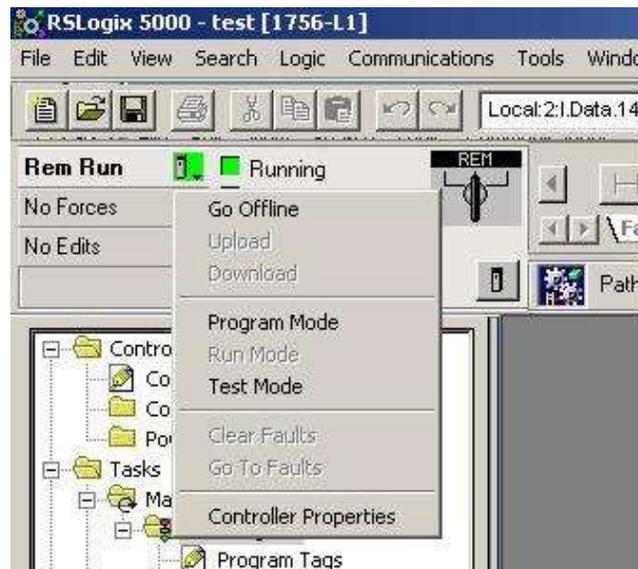
- The green highlight next to Rem Run shows that the processor is in Remote Run mode
- The green box to the left of the word Running says the program is running
- The green box next to the Controller OK text shows that there are no faults in the processor
- The grey box, or more accurately the lack of a red box next to the Battery OK text says that the battery is healthy
- The green box next to the I/O OK indicates that the processor is communicating with all of the configured I/O. If I/O was missing this indicator would be flashing green.

Other indicators on the Online Toolbar include:

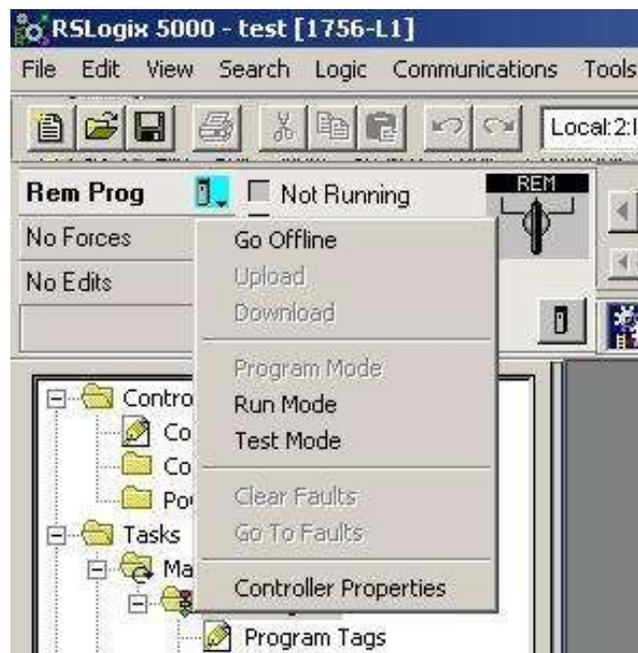
- **Force Information:** Always check for the presence of forces in a project.
- **Edits Information:** If there is an online edit in the processor this indicator will advise if the edit is disabled or being tested.

CPU Modes

There is a pull-down arrow in the green box next to Rem Run. Clicking the pull down arrow displays the following:



Selecting Program Mode places the processor in Remote Program mode. Once in Remote Program the pulldown dialog box shows the following:



Notice the aqua colour and the text Rem Prog, indicating the processor is in Remote Program mode. Selecting Run Mode will place the processor into Remote Run mode.

Lesson Objectives

After the completion of this lesson, the student will be able to:

- Download a project to a CPU
- Upload a project from a CPU

Terminology

- Upload** Transferring a project file from a CPU to RSLogix 5000.
- Download** Transferring a project file from RSLogix 5000 to a CPU.
- Online** RSLogix 5000 is displaying program and data information in the CPU.
- Offline** RSLogix 5000 is displaying program and data stored in the computer.



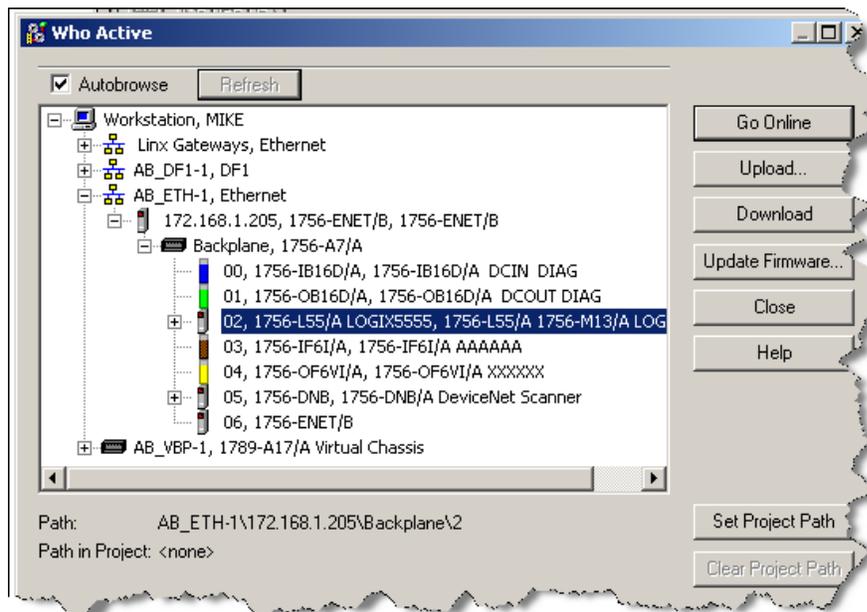
Downloading



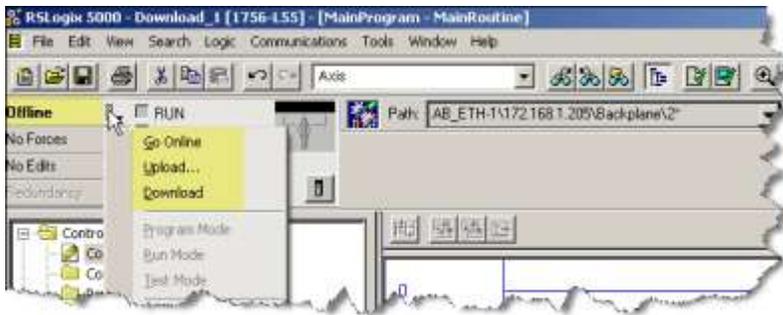
Downloading a project will overwrite the current contents of the CPU (program and data). **Be certain you are downloading the correct project to the correct processor.** A good practice is to always use **Communications > Who Active** to verify the correct path.

To download to a processor:

- 1) A driver in RSLinx must exist or be configured that provides a valid path to the processor.
- 2) The project's CPU type and firmware version must match the hardware and there are no errors in the program.
- 3) The path stored with the project must be correct. If it is incorrect or the path is set <none>, then the path must be manually selected. The path is set with the Who Active dialog box located under the Communication menu. You can then set the path and resave the project or leave it as <none>.



- 4) The download may be initiated from a number of locations:
 - a) From the Communication menu
 - b) From the Online Toolbar
 - c) From the Who Active screen



If the offline project matches the online project then just Go Online. You do not need to Download or Upload.

Uploading

Uploading is the transfer of the program and data from the processor to RSLogix 5000 software and potentially the hard drive of the computer. You will have to perform an upload when:

- 1) There is no project for the processor stored on the computer or RSLogix 5000 software cannot locate it.
- 2) The project on the computer does not match the project in the processor. This could have been caused by someone performing an online edit and not updating the saved copy of the program.

When you upload the project, there will be no rung comments or descriptors; these are stored in the offline project.

Access to the uploading function is the same as it is for downloading:

- From the Communication menu
- From the Online Toolbar
- From the Who Active screen

One difference, between uploading and downloading is you do not have to have a project open when you perform an upload. Use the RSWho function and browse to the processor you wish to upload or go online to.

NOTE: if the CPU name matches an existing project file name in the project folder then RSLogix 5000 will automatically upload to that project.





Your Turn #1



- 1) Copy the ACD file with the same name as the CPU in your demo (Download_L63, Download_L73, etc.) from the USB stick “\supportFiles” sub directory to “c:\RSL5000\Project”. The student files are also located on the computer in the Documents\1_Student_USB\CLX_M1_4 sub directory.
- 2) Open the project.
- 3) Note that there is no path set in the project.
- 4) Set the path to match the demo station. Confirm that the correct path is set.
- 5) Download the project to the demo station and place the processor into the run mode.
- 6) The I/O panel lights on the bottom of the demo should flash sequentially.



Your Turn #2 - Optional

- 1) If you have a project open in RSLogix 5000, close it.
- 2) Using Windows Explorer, delete the project Download_??
- 3) Upload the project from the ControlLogix demo station and then go online to it.
- 4) While online, save your work.
- 5) Finally close the RSLogix 5000 project and delete it from the hard drive.



Your Turn #3

- 1) Download the file you made in a previous lesson ie. Sean_May1.Acd