Allen-Bradley

Logix5000 Controllers

1756 ControlLogix
1769 CompactLogix
1789 SoftLogix
1794 FlexLogix
PowerFlex 700S with DriveLogix

Quick Start

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.ab.com/manuals/gi) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences.
SHOCK HAZARD	Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that dangerous voltage may be present.
BURN HAZARD	Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that surfaces may be dangerous temperatures.

Introduction

This release of this document contains new and updated information. To find new and updated information, look for change bars, as shown next to this paragraph.

New or Updated Information

The document contains the following changes:

This change:	Starts on page:
Updated RSLogix 5000 screen shots to accurately reflect the software's appearance in version 15	1-2
Described configuration requirements for a standalone EtherNet/IP	5-3

Notes:

Preface

When to Use This Manual

The manual is one of various Logix5000 manuals.

You are here

To:	See:
get started with a Logix5000 controller	*Logix5000 Controllers*, publication 1756-QS001
Look up abbreviated information and procedures regarding programming languages, instructions, communications, and status	*Logix5000 Controllers System Reference*, publication 1756-QR007
program a Logix5000 controller—detailed and comprehensive information	*Logix5000 Controllers Common Procedures*, publication 1756-PM001
program a specific Logix5000 programming instruction	• *Logix5000 Controllers General Instructions Reference Manual*, publication 1756-RM003 • *Logix5000 Controllers Process and Drives Instructions Reference Manual*, publication 1756-RM006 • *Logix5000 Controllers Motion Instruction Set Reference Manual*, publication 1756-RM007
import or export a Logix5000 project or tags from or to a text file	*Logix5000 Controllers Import/Export Reference Manual*, publication 1756-RM084
convert a PLC-5 or SLC 500 application to a Logix5000 project	*Logix5550 Controller Converting PLC-5 or SLC 500 Logic to Logix5550 Logic Reference Manual*, publication 1756-6.8.5
integrate a specific Logix5000 controller within a system of controllers, I/O modules, and other devices	• *CompactLogix System User Manual*, publication1769-UM007 • *ControlLogix System User Manual*, publication 1756-UM001 • *DriveLogix Controller User Manual*, publication 20D-UM002 • *FlexLogix System User Manual*, publication1794-UM001 • *SoftLogix5800 System User Manual*, publication 1789-UM002
control devices over an EtherNet/IP network	*EtherNet/IP Modules in Logix5000 Control Systems User Manual*, publication ENET-UM001
control devices over an ControlNet™ network	*ControlNet Modules in Logix5000 Control Systems User Manual*, publication CNET-UM001
control devices over an DeviceNet™ network	*DeviceNet Modules in Logix5000 Control Systems User Manual*, publication DNET-UM004

Purpose of This Manual

This manual provides a starter set of procedures to:

- establish communication with a Logix5000 controller
- program a Logix5000 controller
- perform online maintenance tasks such a search and edit logic, run a histogram, clear faults, and force I/O values.

A Logix5000 controller is any of the following:

- 1756 ControlLogix® controllers
- 1769 CompactLogix™ controllers
- 1789 SoftLogix5800™ controllers
- 1794 FlexLogix™ controllers
- PoweFlex®700S with DriveLogix™ controllers

Who Should Use this Manual

This manual is for those who program or maintain industrial automation systems.

To use this manual, you must already have experience with:

- programmable controllers
- industrial automation systems
- personal computers and Windows® 95, Windows 98, Windows NT®, or Windows 2000 operating system

How to Use this Manual

As you use this manual, you will see some terms that are formatted differently from the rest of the text:

Text that is:	Identifies:	For example:	Means:
Italic	the actual name of an item that you see on your screen or in an example	Right-click *User-Defined* …	Right-click on the item that is named User-Defined.
`courier`	information that you must supply based on your application (a variable)	Right-click `name_of_program` …	You must identify the specific program in your application. Typically, it is a name or variable that you have defined.
enclosed in brackets	a keyboard key	Press [Enter].	Press the Enter key.

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Document a Project

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Chapter 7

Troubleshoot the Controller

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Program and Test a Simple Project

Using This Chapter

This chapter introduces the basic programming sequence for a Logix5000™ controller.

- It covers the steps required to develop and test a ladder or function block diagram.
- The examples in the chapter show how to control a digital or analog output based on the state of a digital or analog input.

To program and test a simple project:

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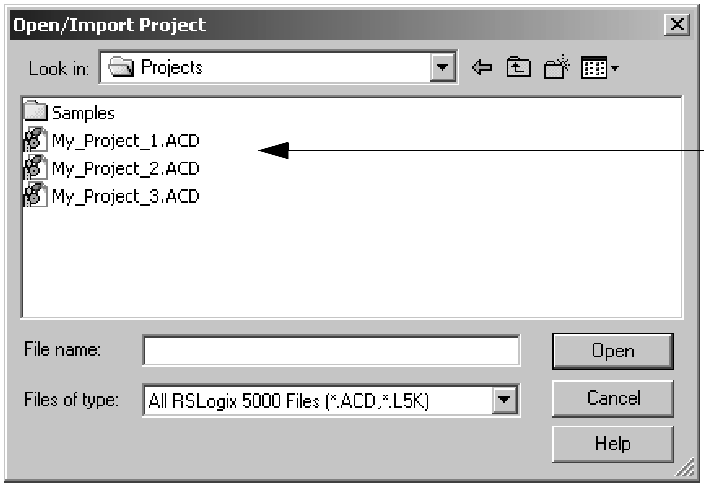
The rest of the chapters in this publication provide more detailed information on how to program, edit, and troubleshoot a project.

Create a Project for the Controller

To configure and program a Logix5000 controller, you use RSLogix™ 5000 software to create and manage a project for the controller.



Look in: Projects

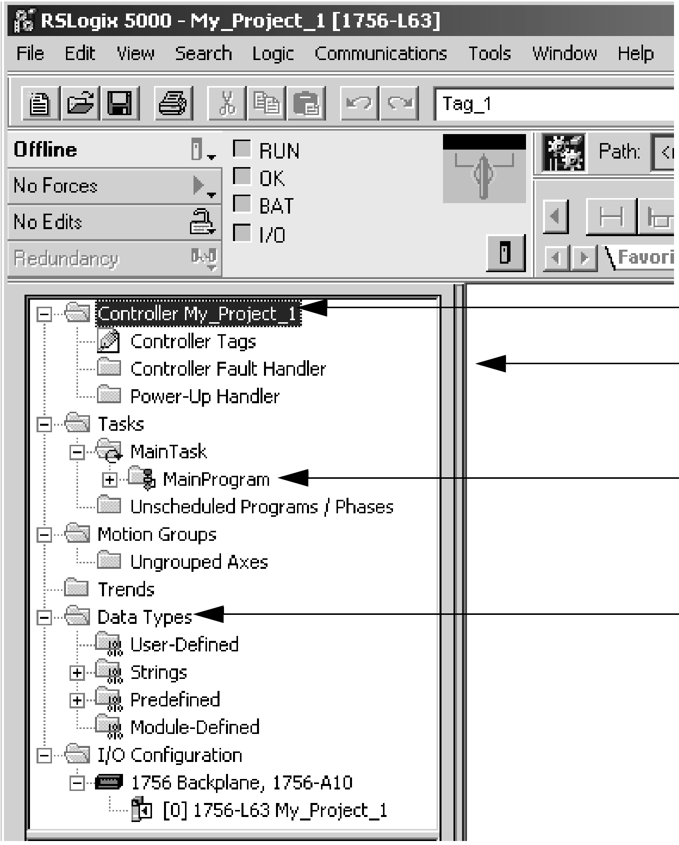
Files of type: All RSLogix 5000 Files (*.ACD,*.L5K)

project – The file on your workstation (or server) that stores the logic, configuration, data, and documentation for a controller.

- The file for the project has an .ACD extension.
- When you create a project, the project name is the same as the name of the controller.
- The controller name is independent of the project name. You can rename either the project name or the controller name.

name of the project

If you rename the project or controller, both names are shown.



name of the controller

controller organizer – graphical overview of the project. Use the controller organizer to navigate to the various components of a project.

To open a folder and show its contents, either:

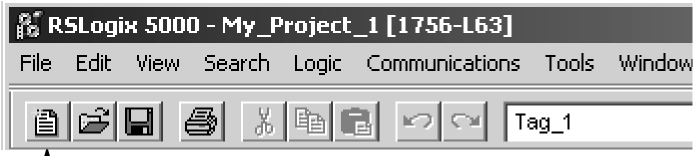
- Double-click the folder.
- Click the + sign.

To close a folder and hide its contents, either:

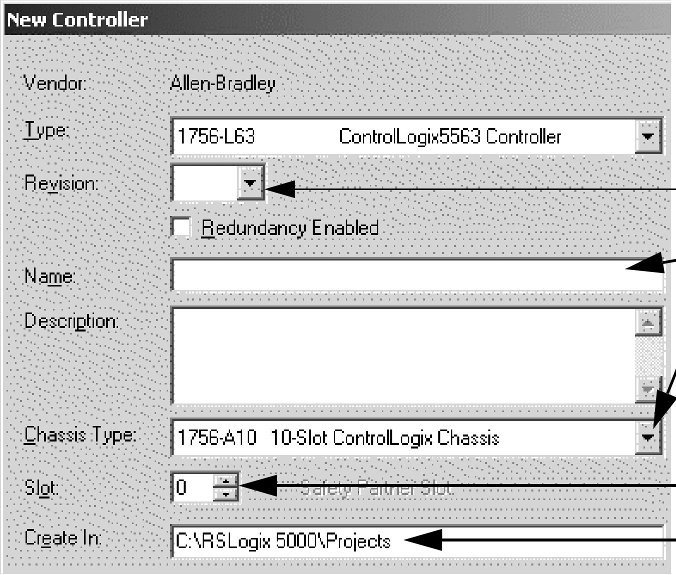
- Double-click the folder.
- Click the – sign.

Create a Project

1. Start RSLogix 5000 software.


RSLogix 5000 - My_Project_1 [1756-L63]
File Edit View Search Logic Communications Tools Window
Tag_1

2. Click the New button.



Vendor: Allen-Bradley

Type: 1756-L63 ControlLogix5563 Controller

Revision:

□ Redundancy Enabled

Name:

Description:

Chassis Type: 1756-A10 10-Slot ControlLogix Chassis

Slot: 0 Safety Partner Slot:

Create In: C:\RSLogix 5000\Projects

3. Specify the general configuration for the controller (some items apply to only certain controllers).
   a. type of controller
   b. major revision of firmware for the controller
   c. name for the controller
   d. chassis size for the controller
   e. slot number of the controller
   f. folder that stores the project

4. Choose OK

Conventions for Names

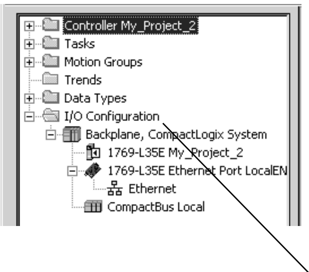
Throughout a Logix5000 project, you define names for the different elements of the project such as the controller, data addresses (tags), routines, I/O modules, etc. As you enter names, follow these rules:

- only letters, numbers, and underscores (_)
- must start with a letter or an underscore
- ≤ 40 characters
- no consecutive or trailing underscores
- *not* case sensitive

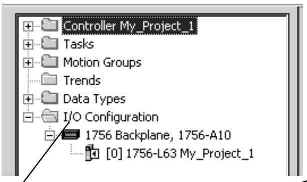
Add Your I/O Modules

To communicate with an I/O modules in your system, you add the modules to the I/O Configuration folder of the controller. The properties you select for each module defines the behavior of the module.

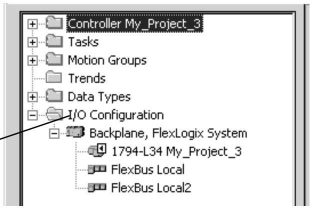
CompactLogix Controller


Controller My_Project_2
Tasks
Motion Groups
Trends
Data Types
I/O Configuration
Backplane, CompactLogix System
1769-L35E My_Project_2
1769-L35E Ethernet Port LocalENB
Ethernet
CompactBus Local

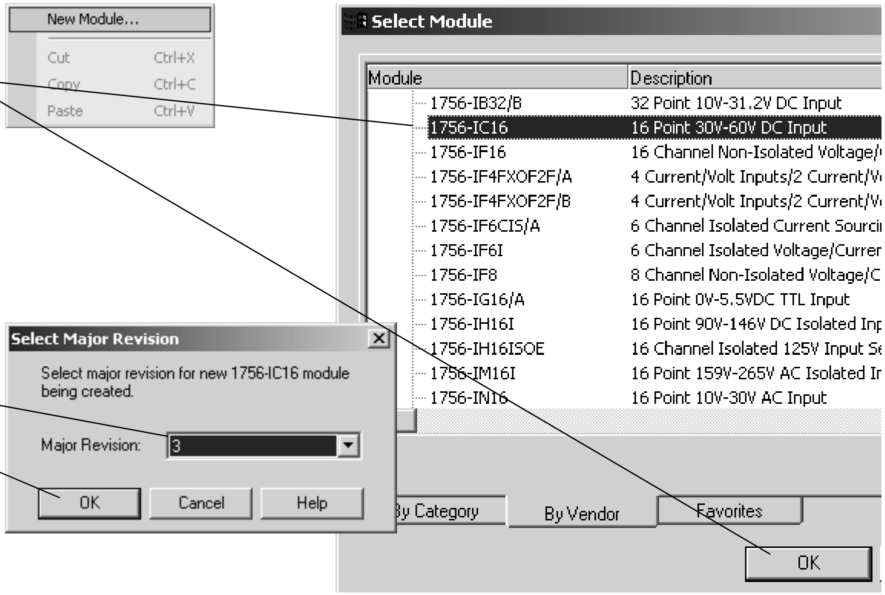
ControlLogix Controller


Controller My_Project_1
Tasks
Motion Groups
Trends
Data Types
I/O Configuration
1756 Backplane, 1756-A10
[0] 1756-L63 My_Project_1

FlexLogix Controller


Controller My_Project_3
Tasks
Motion Groups
Trends
Data Types
I/O Configuration
Backplane, FlexLogix System
1794-L34 My_Project_3
FlexBus Local
FlexBus Local2

1. Right-click and choose *New Module*.
2. Select the type of module.
3. Select the revision of the module.



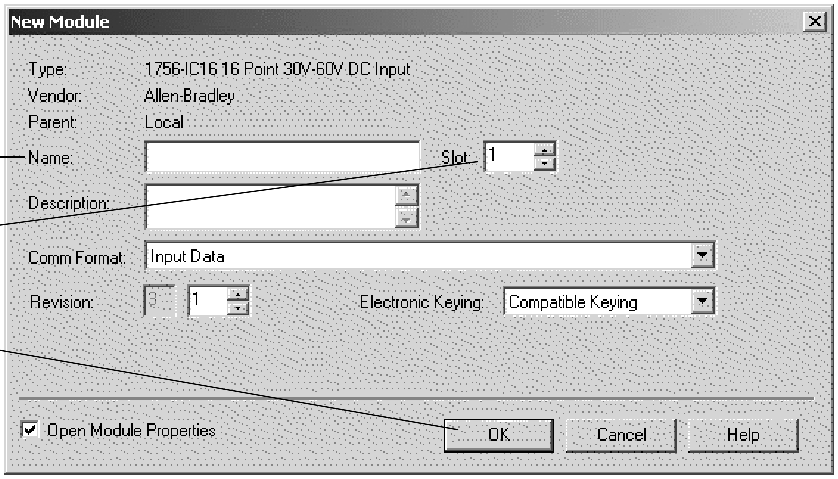
Select Module

Module	Description
1756-IB32/B	32 Point 10V-31.2V DC Input
1756-IC16	16 Point 30V-60V DC Input
1756-IF16	16 Channel Non-Isolated Voltage/(
1756-IF4FXOF2F/A	4 Current/Volt Inputs/2 Current/V
1756-IF4FXOF2F/B	4 Current/Volt Inputs/2 Current/V
1756-IF6CIS/A	6 Channel Isolated Current Sourci
1756-IF6I	6 Channel Isolated Voltage/Currer
1756-IF8	8 Channel Non-Isolated Voltage/C
1756-IG16/A	16 Point 0V-5.5VDC TTL Input
1756-IH16I	16 Point 90V-146V DC Isolated Inp
1756-IH16ISOE	16 Channel Isolated 125V Input Se
1756-IM16I	16 Point 159V-265V AC Isolated Ir
1756-IN16	16 Point 10V-30V AC Input

Select Major Revision

Select major revision for new 1756-IC16 module being created.

Major Revision: 3

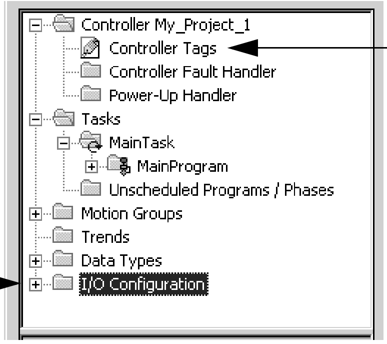

New Module

Type: 1756-IC16 16 Point 30V-60V DC Input
Vendor: Allen-Bradley
Parent: Local
Name:
Slot: 1
Description:
Comm Format: Input Data
Revision: 3 1
Electronic Keying: Compatible Keying
☑ Open Module Properties

4. Type a name for the module (up to 40 characters with *no* spaces).
5. Select the location of the module in the chassis or rail.
6. Accept the default configuration for the module.

Look at Your I/O Data

I/O information is presented as a set of tags.



When you add a module to the I/O Configuration folder…

…the software automatically creates controller-scoped tags for the module.

An I/O address follows this format:

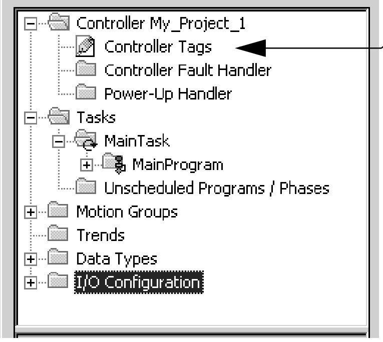
`Location` `:Slot` `:Type` `.Member` `.SubMember` `.Bit`

▨ = Optional

Where:	Is:
`Location`	Network location LOCAL = same chassis or DIN rail as the controller `ADAPTER_NAME` = identifies remote communication adapter or bridge module
`Slot`	Slot number of I/O module in its chassis or DIN rail

`Type`	Type of data
	I = input
	O = output
	C = configuration
	S = status

`Member`	Specific data from the I/O module; depends on what type of data the module can store. • For a digital module, a Data member usually stores the input or output bit values. • For an analog module, a Channel member (CH#) usually stores the data for a channel.
`SubMember`	Specific data related to a Member.
`Bit`	Specific point on a digital I/O module; depends on the size of the I/O module (0-31 for a 32-point module)

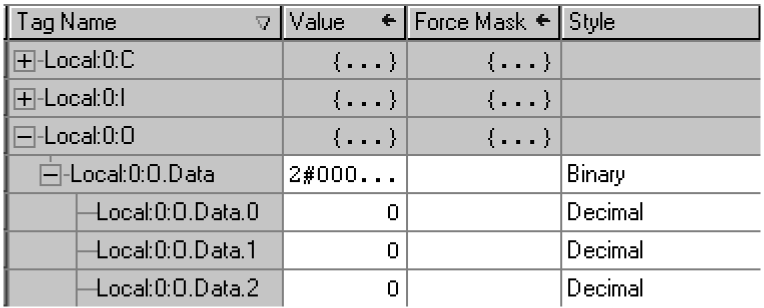


1. Right-click and choose *Monitor Tags*.

Values are shown in the following styles:

Style	**Base**	**Notation**
Binary	2	2#
Decimal	10	NA
Hexadecimal	16	16#
Octal	8	8#
Exponential	NA	0.0000000e+000
Float	NA	0.0

A blue arrow indicates that when you change the value, it immediately takes effect.



Tag Name ▽	Value ←	Force Mask ←	Style
⊞-Local:0:C	{...}	{...}	
⊞-Local:0:I	{...}	{...}	
⊟-Local:0:O	{...}	{...}	
⊟-Local:0:O.Data	2#000...		Binary
Local:0:O.Data.0	0		Decimal
Local:0:O.Data.1	0		Decimal
Local:0:O.Data.2	0		Decimal

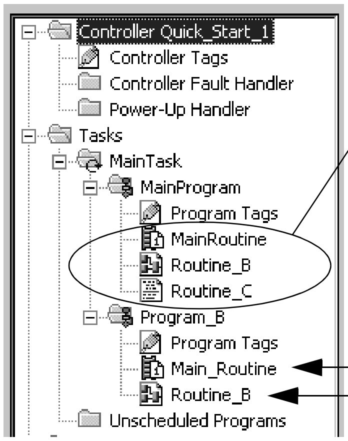
2. To see a value in a different style, select the desired style.

3. To change a value, click the Value cell, type the new value, and press the [Enter] key.

4. To expand a tag and show its members, click the + sign.

Enter Ladder Logic

For a Logix5000 controller, you enter your logic in routines.



routine – provide the executable code (logic) for a program (similar to a program file in a PLC or SLC controller).

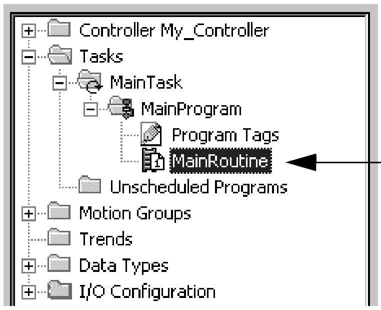
main routine – For each program, you assign a main routine.

- When the program executes, its main routine automatically executes.
- Use the main routine to control the execution of the other routines in the program.
- To call (execute) another routine (subroutine) within the program, use a Jump to Subroutine (JSR) instruction.

subroutine – Any routine other than the main routine or fault routine. To execute a subroutine, use a Jump to Subroutine (JSR) instruction in another routine, such as the main routine.

Open a Routine

When you create a project, the software automatically creates a main routine that uses the ladder diagram programming language.



To open a folder and show its contents, either:

- Double-click the folder.
- Click the + sign.

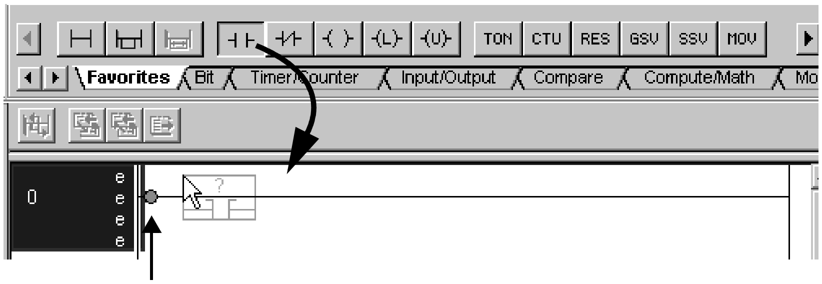
To open a routine, double-click the routine.

Enter Ladder Logic

One way to enter logic is to drag buttons from a toolbar to the desired location.

To add ladder logic, drag the button for the rung or instruction directly to the desired location.

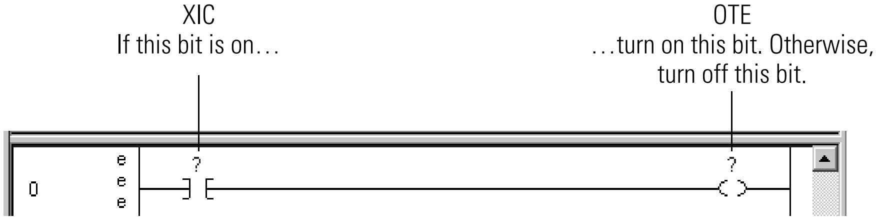
You can enter your logic and leave the operands undefined. After you enter a section of logic, go back and assign the operands.



A green dot shows a valid placement location (drop point).

EXAMPLE

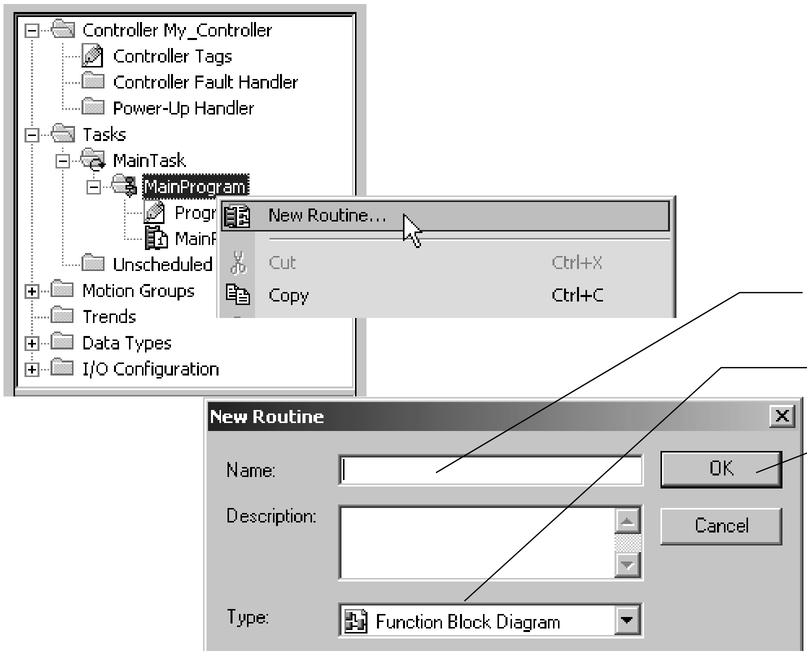
In the following example, an Examine If Closed (XIC) instruction checks the on/off state of a pushbutton. If the pushbutton is on, the Output Energize (OTE) instruction turns on a light.



Enter a Function Block Diagram

Create a Routine

Each routine in your project uses a specific programming language. To program in a different language, such as function block diagram, create a new routine.

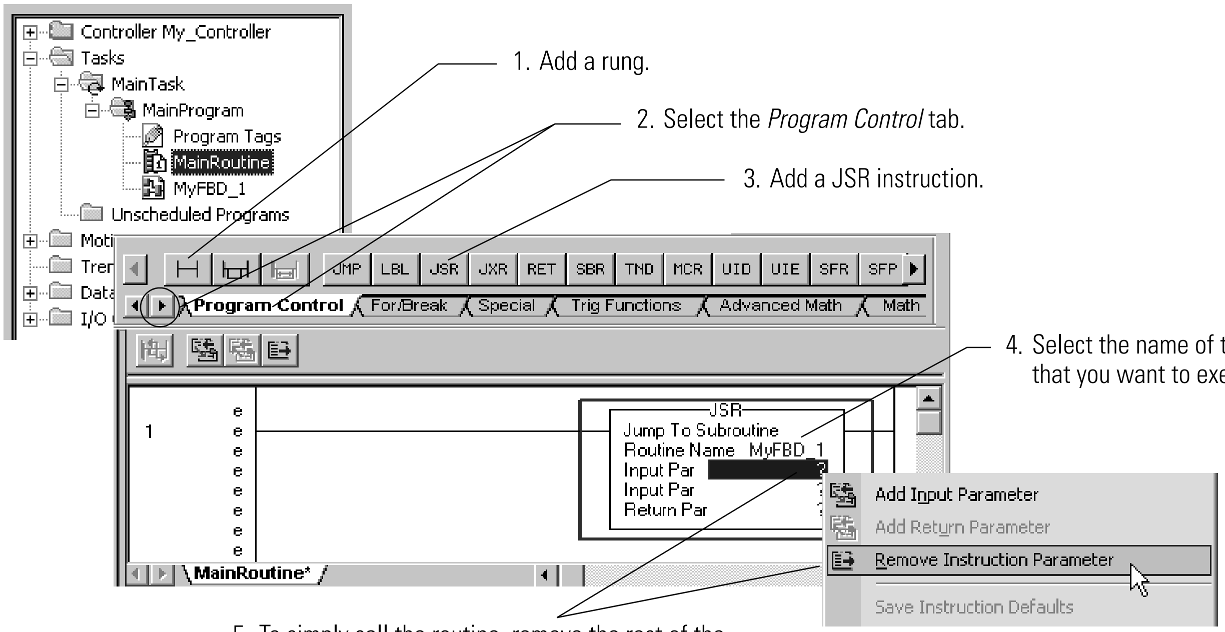


Type: Function Block Diagram

1. Right-click and the program and choose *New Routine*.
2. Type a name for the routine.
3. Choose the programming language.
4. OK

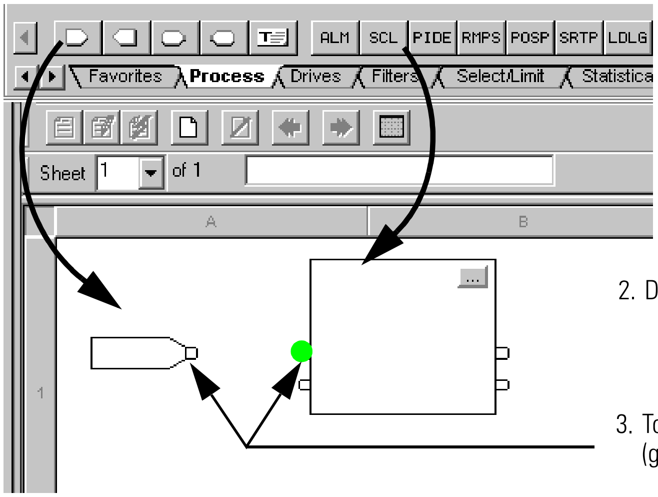
Call the Routine

To execute a routine other than the main routine, use a Jump to Subroutine (JSR) instruction to call the routine.



1. Add a rung.
2. Select the *Program Control* tab.
3. Add a JSR instruction.
4. Select the name of the routine that you want to execute.
5. To simply call the routine, remove the rest of the parameters for the JSR instruction. To remove a parameter, right-click the parameter and choose *Remove Instruction Parameter*.

Enter a Function Block Diagram



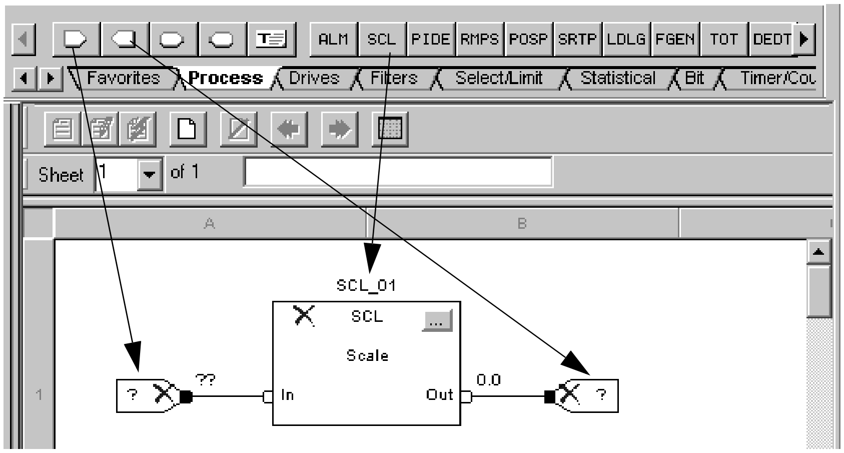
1. Click the tab for the desired instructions.

2. Drag elements from the toolbar to the sheet.

3. To connect elements, click corresponding pins (green dot = valid connection point).

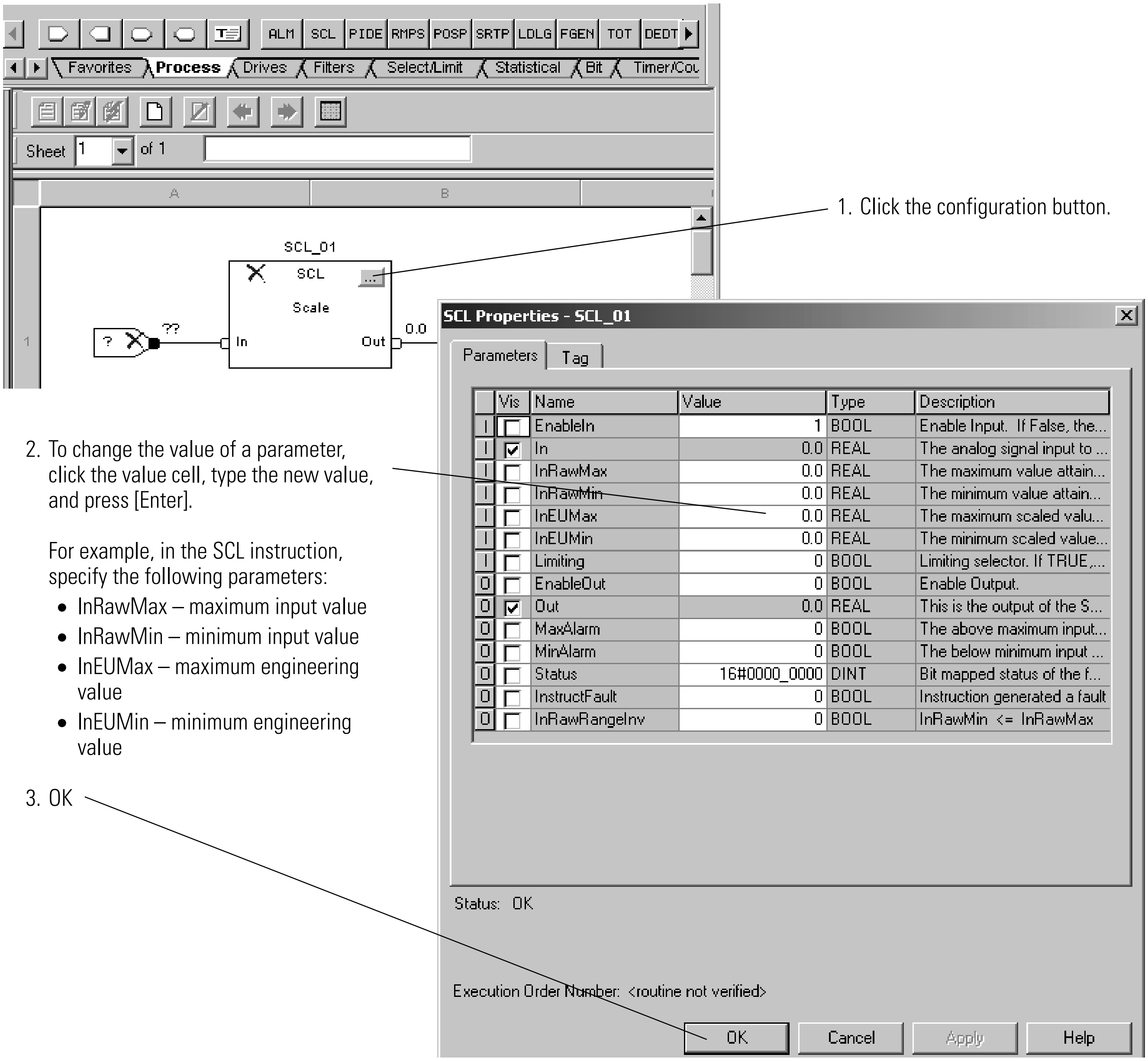
EXAMPLE

In the following example, an Input Reference (IREF) reads the value of an analog input and sends the value to a Scale (SCL) instruction. The SCL instruction converts the value to engineering uses and sends it to an Output Reference (OREF). The OREF writes the value to an analog output.



Configure a Function Block Instruction

To assign specific values (parameters) to a function block:



	Vis	Name	Value	Type	Description
I	□	EnableIn	1	BOOL	Enable Input. If False, the...
I	☑	In	0.0	REAL	The analog signal input to ...
I	□	InRawMax	0.0	REAL	The maximum value attain...
I	□	InRawMin	0.0	REAL	The minimum value attain...
I	□	InEUMax	0.0	REAL	The maximum scaled valu...
I	□	InEUMin	0.0	REAL	The minimum scaled value...
I	□	Limiting	0	BOOL	Limiting selector. If TRUE,...
O	□	EnableOut	0	BOOL	Enable Output.
O	☑	Out	0.0	REAL	This is the output of the S...
O	□	MaxAlarm	0	BOOL	The above maximum input...
O	□	MinAlarm	0	BOOL	The below minimum input ...
O	□	Status	16#0000_0000	DINT	Bit mapped status of the f...
O	□	InstructFault	0	BOOL	Instruction generated a fault
O	□	InRawRangeInv	0	BOOL	InRawMin <= InRawMax

Status: OK

Execution Order Number: <routine not verified>

1. Click the configuration button.

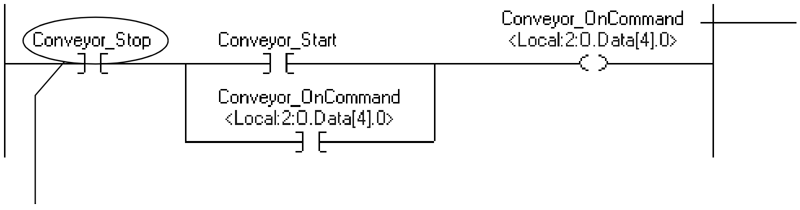
2. To change the value of a parameter, click the value cell, type the new value, and press [Enter].

   For example, in the SCL instruction, specify the following parameters:
   - InRawMax – maximum input value
   - InRawMin – minimum input value
   - InEUMax – maximum engineering value
   - InEUMin – minimum engineering value

3. OK

Assign Alias Tags for Your Devices

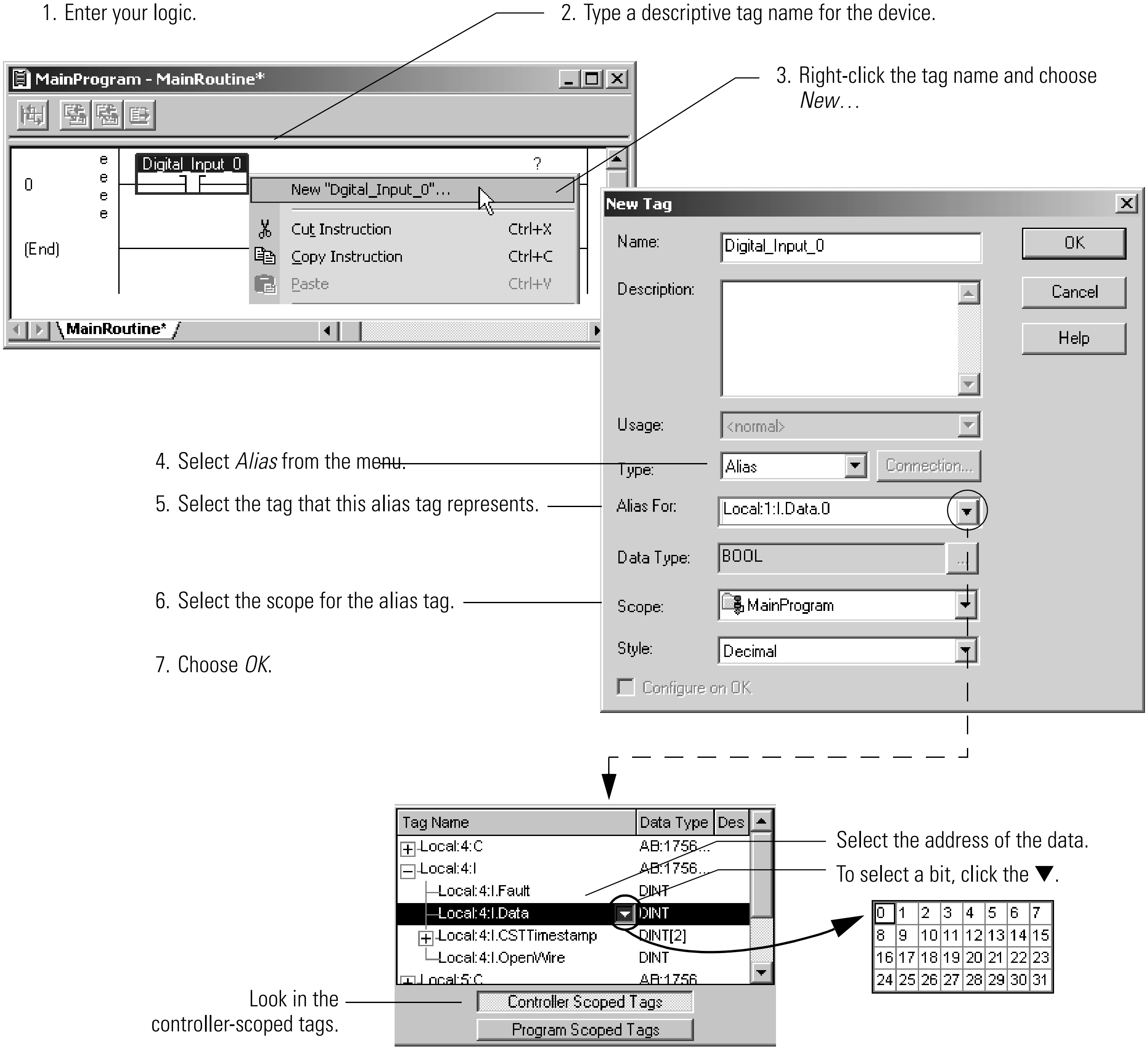
While you can use the input and output tags of a module directly in your logic, it is a lot easier to use alias tags.



alias tag – a tag that represents another tag

- Both tags share the same data.
- When the data changes, both tags change.
- An alias tag provides a descriptive name for data, such as DeviceNet input or output data.
- If the location of the data changes, simply point the alias tag lets to the new location without editing your logic.

As an option, create tags that describe each device without pointing them to the actual addresses of the devices. Later, convert the tags to aliases for the data of the devices.



1. Enter your logic.
2. Type a descriptive tag name for the device.
3. Right-click the tag name and choose *New…*
4. Select *Alias* from the menu.
5. Select the tag that this alias tag represents.
6. Select the scope for the alias tag.
7. Choose *OK*.

New Tag

Name: Digital_Input_0

Description:

Usage: <normal>

Type: Alias

Alias For: Local:1:I.Data.0

Data Type: BOOL

Scope: MainProgram

Style: Decimal

□ Configure on OK

Tag Name	Data Type	Des
⊞-Local:4:C	AB:1756...	
⊟-Local:4:I	AB:1756...	
Local:4:I.Fault	DINT	
Local:4:I.Data	DINT	
⊞-Local:4:I.CSTTimestamp	DINT[2]	
Local:4:I.OpenWire	DINT	
⊞-Local:5:C	AB:1756...	

Select the address of the data.

To select a bit, click the ▼.

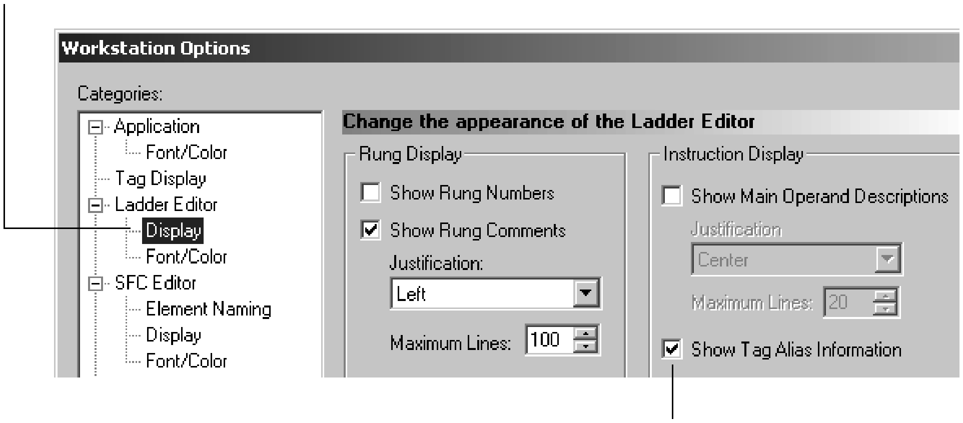
0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31

Look in the controller-scoped tags.

Show or Hide Alias Information

To show or hide that alias information for a tag:

1. Choose *Tools* ⇒ *Options*.
2. Select the *Ladder Editor Display* category.



☐ Show Rung Numbers

☑ Show Rung Comments

Justification: Left

Maximum Lines: 100

☐ Show Main Operand Descriptions

Justification: Center

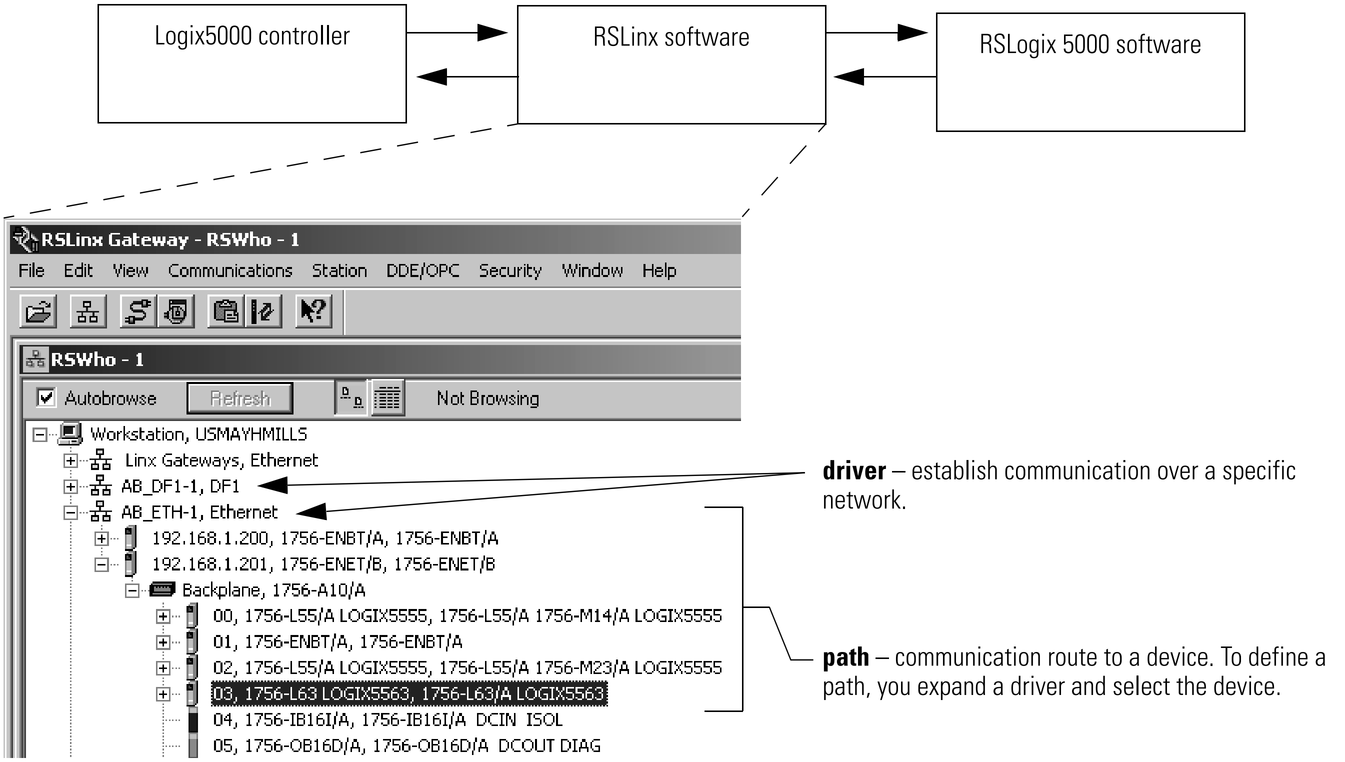
Maximum Lines: 20

☑ Show Tag Alias Information

3. Check or uncheck this box.
4. Choose OK

Establish a Serial Connection to the Controller

RSLinx® software handles communication between Logix5000 controllers and your software programs, such as RSLogix 5000 software. To communicate with a controller (e.g., download, monitor data), configure RSLinx software for the required communication.



Workstation, USMAYHMILLS
Linx Gateways, Ethernet
AB_DF1-1, DF1
AB_ETH-1, Ethernet
192.168.1.200, 1756-ENBT/A, 1756-ENBT/A
192.168.1.201, 1756-ENET/B, 1756-ENET/B
Backplane, 1756-A10/A
00, 1756-L55/A LOGIX5555, 1756-L55/A 1756-M14/A LOGIX5555
01, 1756-ENBT/A, 1756-ENBT/A
02, 1756-L55/A LOGIX5555, 1756-L55/A 1756-M23/A LOGIX5555
03, 1756-L63 LOGIX5563, 1756-L63/A LOGIX5563
04, 1756-IB16I/A, 1756-IB16I/A DCIN ISOL
05, 1756-OB16D/A, 1756-OB16D/A DCOUT DIAG

driver – establish communication over a specific network.

path – communication route to a device. To define a path, you expand a driver and select the device.

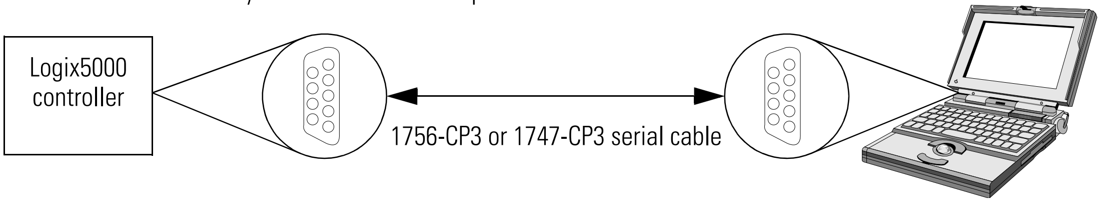
Use a serial cable to establish a point-to-point connection between the serial ports on your computer and controller.

WARNING

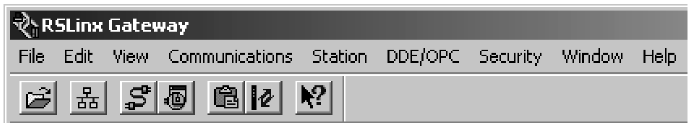
If you connect or disconnect the serial cable with power applied to this module or the serial device on the other end of the cable, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

1. Connect a serial cable to your controller and computer.

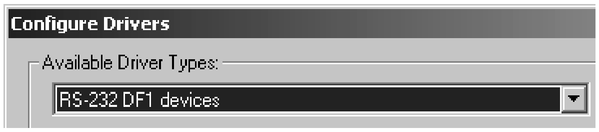


2. Configure an RS-232 driver:


RSLinx Gateway
File Edit View Communications Station DDE/OPC Security Window Help

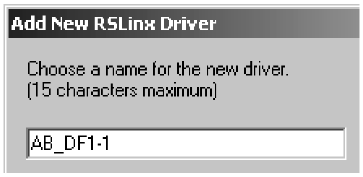
a. Start RSLinx software.

b. Click .


Configure Drivers

Available Driver Types: RS-232 DF1 devices

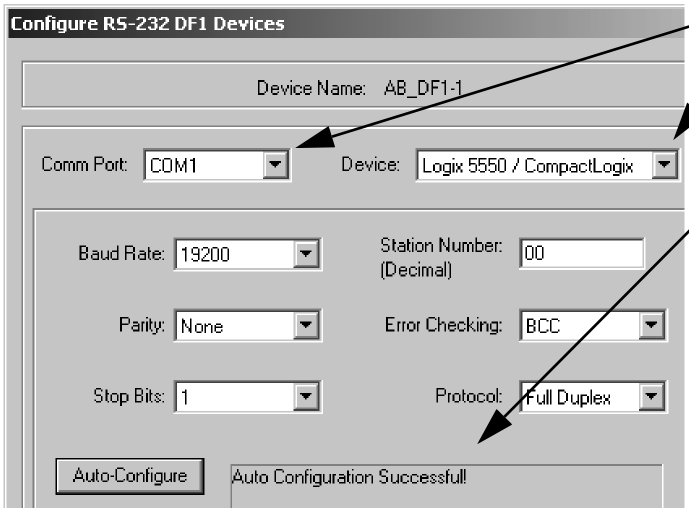
c. Select *RS-232 DF1 devices* and choose Add New...


Add New RSLinx Driver

Choose a name for the new driver.
(15 characters maximum)

AB_DF1-1

d. Accept the default name.


Configure RS-232 DF1 Devices

Device Name: AB_DF1-1

Comm Port: COM1
Device: Logix 5550 / CompactLogix

Baud Rate: 19200
Station Number: (Decimal) 00
Parity: None
Error Checking: BCC
Stop Bits: 1
Protocol: Full Duplex

Auto-Configure

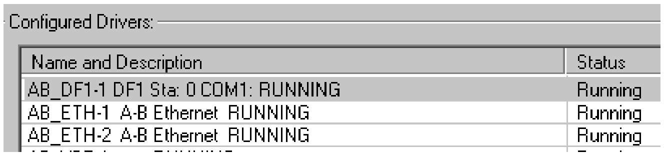
Auto Configuration Successful!

e. Select the COM port of your computer.

f. Select *Logix 5550/CompactLogix*.

g. Choose Auto-Configure

h. When the auto-configuration completes, choose OK


Configured Drivers:

Name and Description	Status
AB_DF1-1 DF1 Sta: 0 COM1: RUNNING	Running
AB_ETH-1 A-B Ethernet RUNNING	Running
AB_ETH-2 A-B Ethernet RUNNING	Running

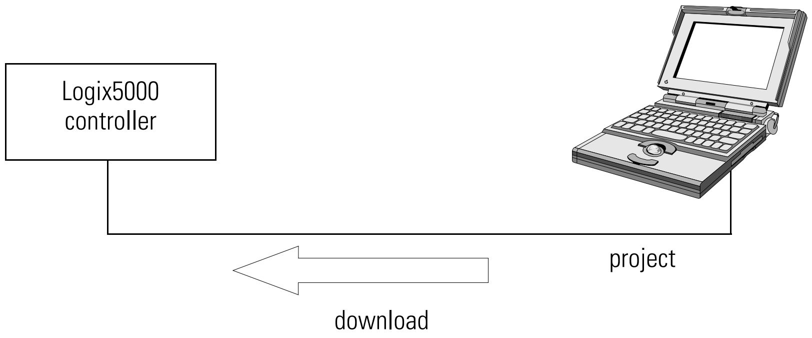
The driver is successfully configured and running.

Download a Project to the Controller

To execute a project in a controller, download the project to the controller.

ATTENTION

When you download a project or update firmware, all active servo axes are turned off. Before you download a project or update firmware, make sure that this *will not* cause any unexpected movement of an axis.



download – transfer a project from your computer to the controller so you can run the project.

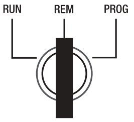
- When you download a project, you lose the project and data that is currently in the controller, if any.
- If the revision of the controller does not match the revision of the project, you are prompted to update the firmware of the controller. RSLogix 5000 software lets you update the firmware of the controller as part of the download sequence.

IMPORTANT

To update the firmware of a controller, first install a firmware upgrade kit.

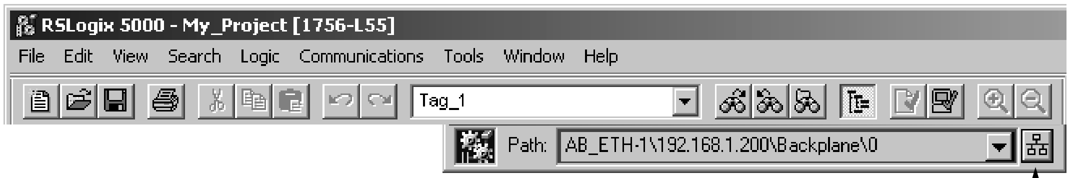
- An upgrade kit ships on a supplemental CD along with RSLogix 5000 software.
- To download an upgrade kit, go to www.ab.com. Choose *Product Support*. Choose *Firmware Updates*.

1. Turn the keyswitch of the controller to:



2. Define the path to the controller:

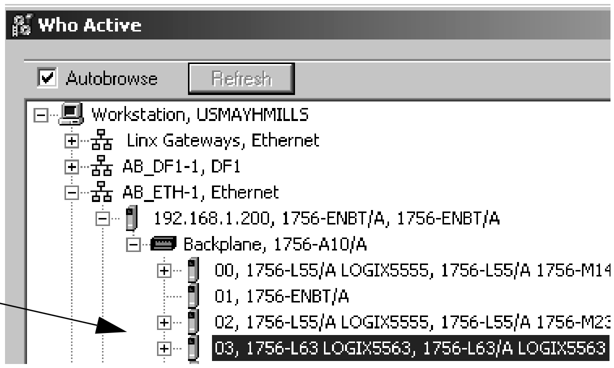
   a. Open the RSLogix 5000 project that you want to download.


RSLogix 5000 - My_Project [1756-L55]
File Edit View Search Logic Communications Tools Window Help
Tag_1

Path: AB_ETH-1\192.168.1.200\Backplane\0

   b. Click 品.

   c. Browse to the controller.
   - To open a level, click the + sign.
   - When you see the controller, select it.



```
⊟ Workstation, USMAYHMILLS
  ⊞ Linx Gateways, Ethernet
  ⊞ AB_DF1-1, DF1
  ⊟ AB_ETH-1, Ethernet
    ⊟ 192.168.1.200, 1756-ENBT/A, 1756-ENBT/A
      ⊟ Backplane, 1756-A10/A
        ⊞ 00, 1756-L55/A LOGIX5555, 1756-L55/A 1756-M14
          01, 1756-ENBT/A
        ⊞ 02, 1756-L55/A LOGIX5555, 1756-L55/A 1756-M23
        ⊞ 03, 1756-L63 LOGIX5563, 1756-L63/A LOGIX5563
```

3. Download the project:

   a. Choose Download

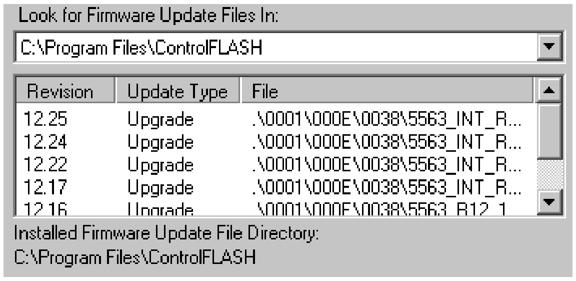
Which response did RSLogix 5000 software give?

Download to the controller.

b. Choose Download

Failed to download to the controller. The revision of the offline project and controller's firmware are not compatible.

b. Choose Update Firmware...



Look for Firmware Update Files In:

C:\Program Files\ControlFLASH

Revision	Update Type	File
12.25	Upgrade	.\0001\000E\0038\5563_INT_R...
12.24	Upgrade	.\0001\000E\0038\5563_INT_R...
12.22	Upgrade	.\0001\000E\0038\5563_INT_R...
12.17	Upgrade	.\0001\000E\0038\5563_INT_R...
12.16	Upgrade	.\0001\000E\0038\5563_B12_1

Installed Firmware Update File Directory:
C:\Program Files\ControlFLASH

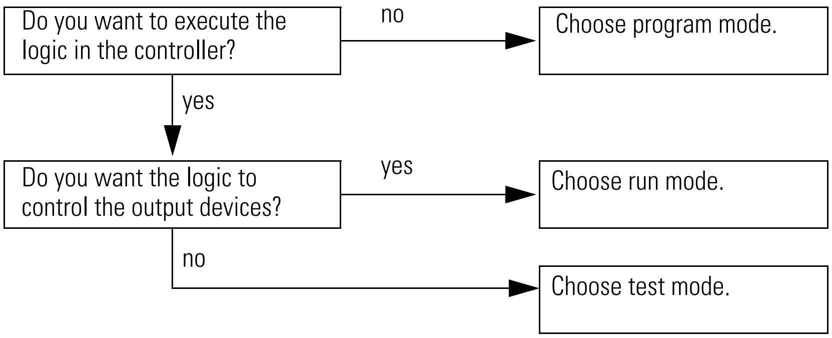
c. Choose the revision for the controller.

d. Choose Update... and then Yes

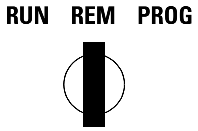
Select the Operating Mode of the Controller

To execute or stop executing the logic in a controller, change the operating mode of the controller.

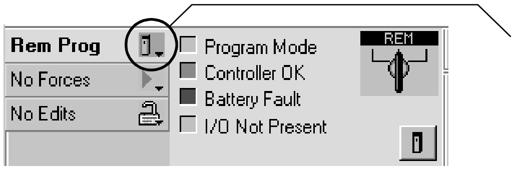
1. Determine which mode you want for the controller:


Do you want to execute the logic in the controller?
no
Choose program mode.
yes
Do you want the logic to control the output devices?
yes
Choose run mode.
no
Choose test mode.

2. Turn the keyswitch to



3. Go online with the controller.



4. Select the mode.

Notes:

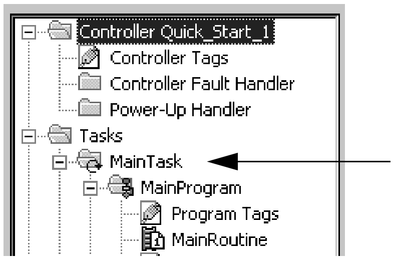
Organize a Project

Using This Chapter

This chapter provides more detailed information on how to organize the program lay-out and data structures for the controller:

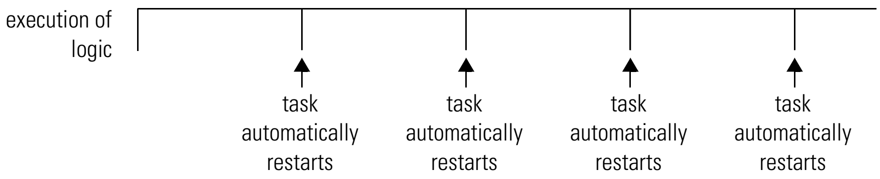
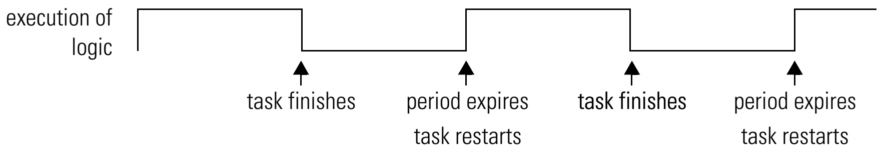
Configure the Task Execution

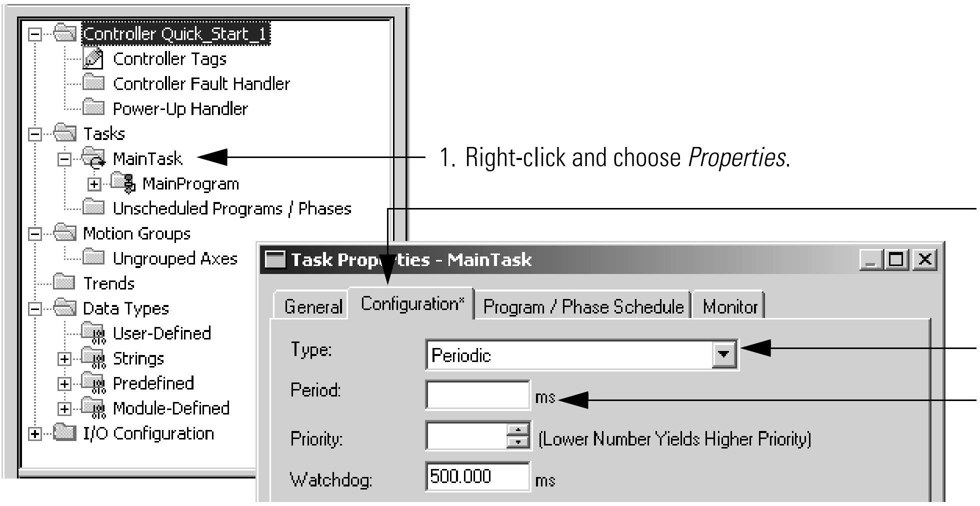
A new project contains a default task for the execution of your logic.



task – define scheduling and priority information for the execution (scan) of your logic.

In this quick start, we limit the project to a single task with one of the following types of execution:

If you want to execute your logic:	Then configure the task for this type of execution:
all of the time  execution of logic task automatically restarts task automatically restarts task automatically restarts task automatically restarts	continuous This is the default configuration of *MainTask*.
at a specific period  execution of logic task finishes period expires task restarts task finishes period expires task restarts	periodic You define the period at which the task executes.



Type: Periodic

Period: ms

Priority: (Lower Number Yields Higher Priority)

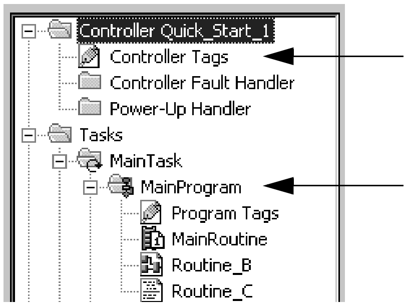
Watchdog: 500.000 ms

1. Right-click and choose *Properties*.
2. Click the *Configuration* tab.
3. Choose *Periodic*.
4. Type the period for the task.
5. Choose OK

To use multiple tasks or execute a task when a specific event (trigger) occurs, see *Logix5000 Controllers Common Procedures*, publication 1756-PM001.

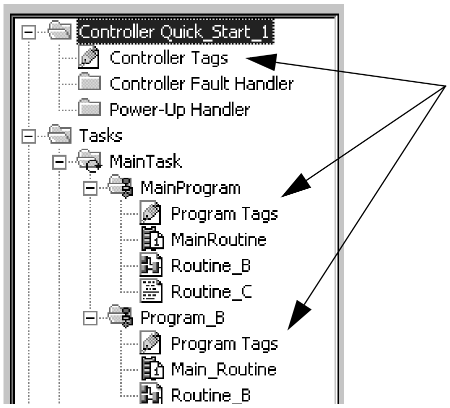
Create Additional Programs

A Logix5000 controller lets you divide your application into multiple programs, each with its own tags (data).



tag – store data. There is no fixed data table or numeric format for data addresses. The tag name is the address (no cross-reference to a physical address). You create the tags that you want to use.

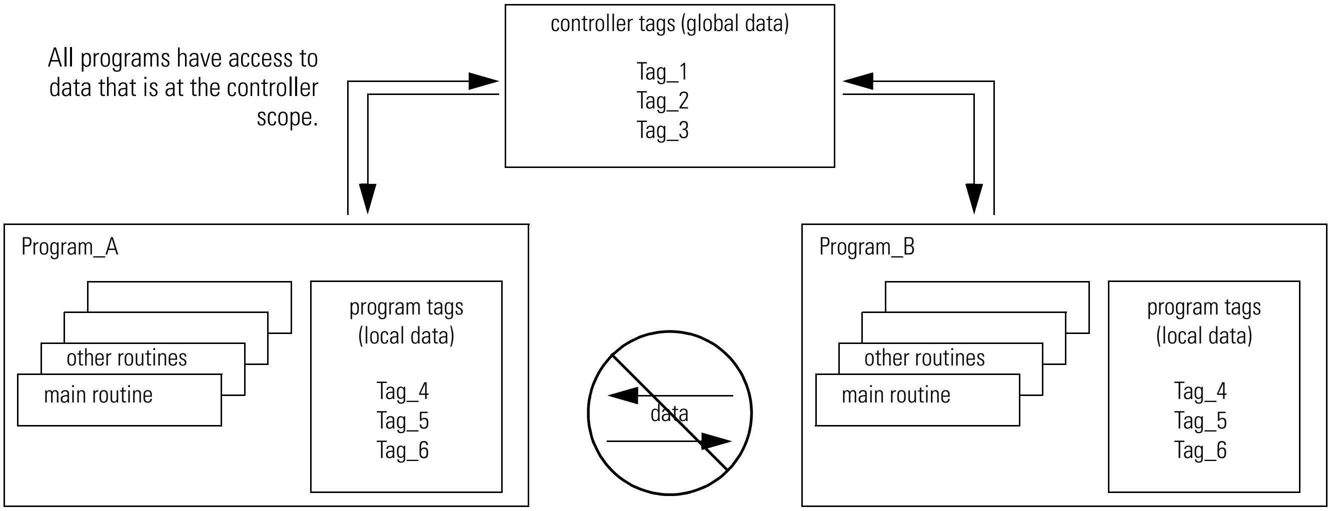
program – isolate logic and data from other logic and data. Each program contains one or more logic routines as associated data.



scope – define whether a tag is accessible to all programs (controller tag) or limited to a specific program (program tag). Data at the program scope is isolated from other programs.

There is no need to manage conflicting tag names between the programs.

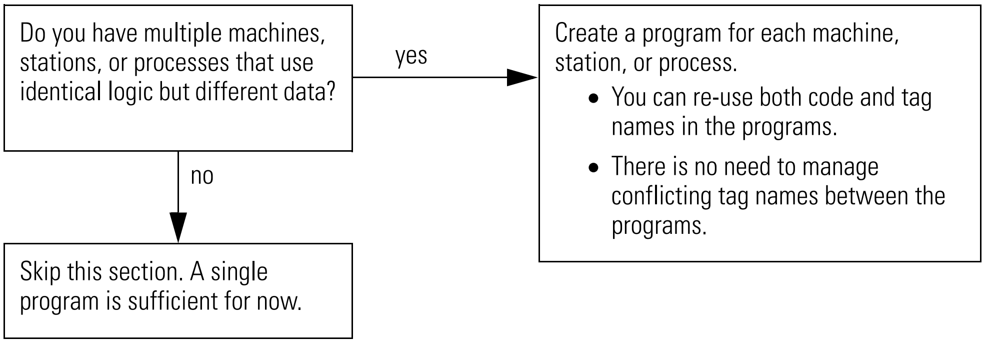
All programs have access to data that is at the controller scope.



Data at the program scope is isolated from other programs:

- Routines cannot access data that is at the program scope of another program.
- You can re-use the tag name of a program-scoped tag in multiple programs.

  For example, both Program_A and Program_B can have a program tag named Tag_4.



Do you have multiple machines, stations, or processes that use identical logic but different data?

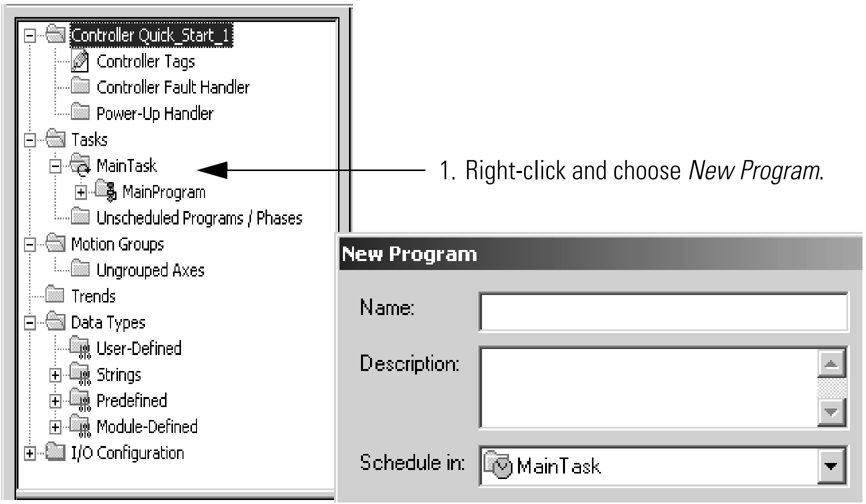
yes

Create a program for each machine, station, or process.

- You can re-use both code and tag names in the programs.
- There is no need to manage conflicting tag names between the programs.

no

Skip this section. A single program is sufficient for now.



Name:

Description:

Schedule in: MainTask

1. Right-click and choose *New Program.*
2. Type a name for the program.
3. Choose OK

TIP

Names:

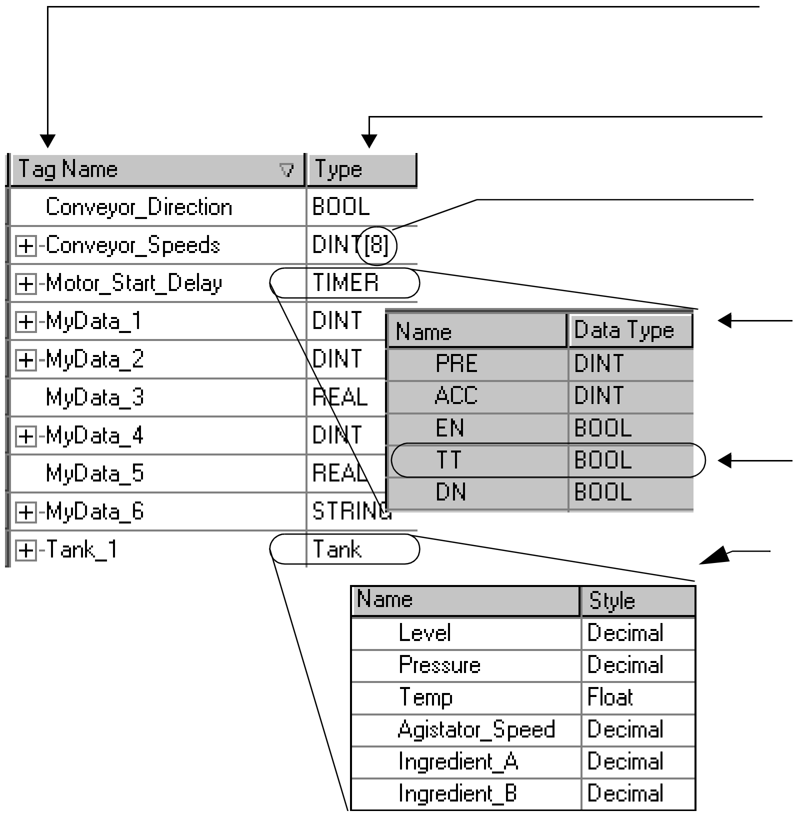
- only letters, numbers, and underscores (_)
- must start with a letter or an underscore
- ≤ 40 characters
- no consecutive or trailing underscores
- *not* case sensitive

Certain tags must be controller scope.

If you want to use a tag:	Then use this scope:
in more than one program in the project	Controller Tags
in a Message (MSG) instruction	
to produce or consume data	
to communicate with a PanelView terminal	
in a single program only	Program Tags for the program

Create User-Defined Data Types

User-defined data types let you organize your data to match your machine or process. This streamlines program development and creates self-documenting code that is easier to maintain.



Tag Name	Type
Conveyor_Direction	BOOL
+-Conveyor_Speeds	DINT[8]
+-Motor_Start_Delay	TIMER
+-MyData_1	DINT
+-MyData_2	DINT
MyData_3	REAL
+-MyData_4	DINT
MyData_5	REAL
+-MyData_6	STRING
+-Tank_1	Tank

Name	Data Type
PRE	DINT
ACC	DINT
EN	BOOL
TT	BOOL
DN	BOOL

Name	Style
Level	Decimal
Pressure	Decimal
Temp	Float
Agistator_Speed	Decimal
Ingredient_A	Decimal
Ingredient_B	Decimal

tag – store data. There is no fixed data table or numeric format for data addresses. The tag name is the address. You create the tags that you want to use.

data type – define the type of data that a tag stores, such as a bit, integer, floating-point value, string, etc.

array – define a block of data (file). The entire block uses the same data type. It can have 1, 2, or 3 dimensions.

structure – combine a group of data types into a re-usable format (template for tags). Use a structure as the basis for multiple tags with the same data lay-out.

member – describe an individual piece of data within a structure

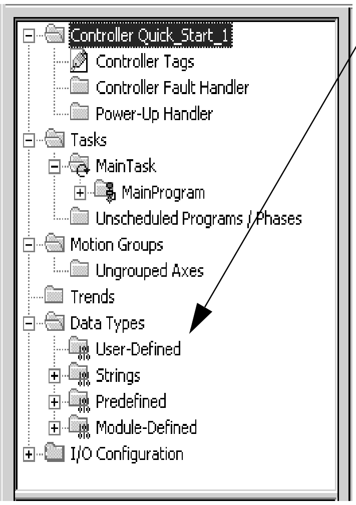
user-defined data type – create your own structure that emulates your devices. A user-defined data type stores all the data related to a specific aspect of your system. This keeps related data together and easy to locate, regardless of its data type.

As you create user-defined data types, follow these guidelines:

Guideline:	Details:
1. Consider the pass-through of descriptions.	See *Describe a User-Defined Data Type* on page 4-2.
2. Data that represents an I/O device requires additional programming.	If you include members that represent I/O devices, you must use logic to copy the data between the members in the user-defined data type and the corresponding I/O tags.
3. If you include an array as a member, limit the array to a single dimension.	Multi-dimension arrays are *not* permitted in a user-defined data type.
4. When you use the BOOL, SINT, or INT data types, place members that use the same data type in sequence:	Logix5000 controllers allocate memory in 4-byte chunks. If you sequence smaller data types together, the controller packs as many as it can fit into a 4-byte chunk. **more efficient** BOOL BOOL BOOL DINT DINT **less efficient** BOOL DINT BOOL DINT BOOL

To create a user-defined data type and tags that use the data type:

1. Create a user-defined data type:



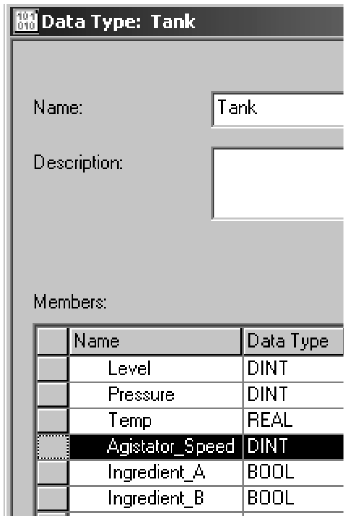
a. Right-click and choose *New Data Type*.

b. Type a name for the data type (*not* the name of a tag that will use the data type).

c. Enter the members.

As an option, type a description for each member.

d. Choose OK


Data Type: Tank

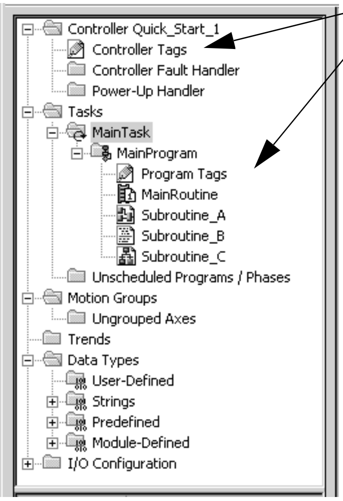
Name: Tank

Description:

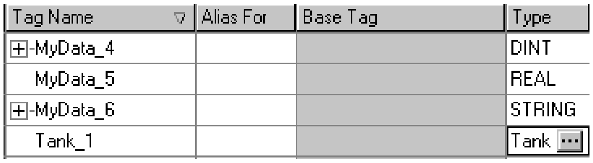
Members:

Name	Data Type
Level	DINT
Pressure	DINT
Temp	REAL
Agistator_Speed	DINT
Ingredient_A	BOOL
Ingredient_B	BOOL

2. Create a tag that uses the user-defined data type:



a. Right-click the scope that you want for the tag and choose *Edit Tags*.



Tag Name ▽	Alias For	Base Tag	Type
⊞-MyData_4			DINT
MyData_5			REAL
⊞-MyData_6			STRING
Tank_1			Tank ···

b. Type a name for the tag

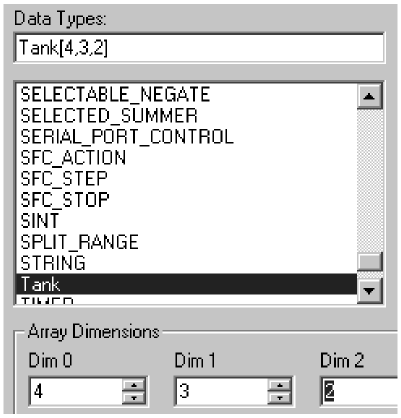
c. Type the name of the user-defined data type from step 1.

3. If you want the tag to be an array (multiple instances of the data type):

c. Select the data type and click ···

d. Specify the array dimensions.

e. Choose OK


Data Types: Tank[4,3,2]

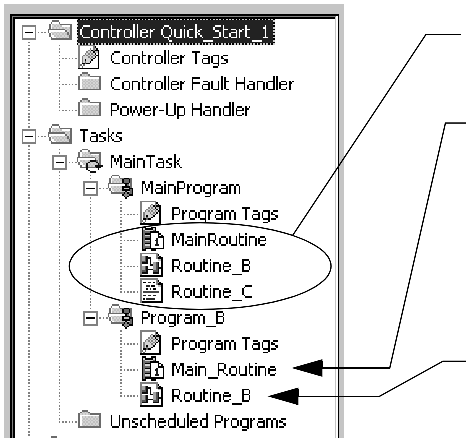
SELECTABLE_NEGATE
SELECTED_SUMMER
SERIAL_PORT_CONTROL
SFC_ACTION
SFC_STEP
SFC_STOP
SINT
SPLIT_RANGE
STRING
Tank
TIMER

Array Dimensions

Dim 0	Dim 1	Dim 2
4	3	2

Define Your Routines

Once your project has the required programs, you have to define and create the routines for each program.



routine – provide the executable code (logic) for a program (similar to a program file in a PLC or SLC controller).

main routine – For each program, you assign a main routine.

- When the program executes, its main routine automatically executes.
- Use the main routine to control the execution of the other routines in the program.
- To call (execute) another routine (subroutine) within the program, use a Jump to Subroutine (JSR) instruction.

subroutine – Any routine other than the main routine or fault routine. To execute a subroutine, use a Jump to Subroutine (JSR) instruction in another routine, such as the main routine.

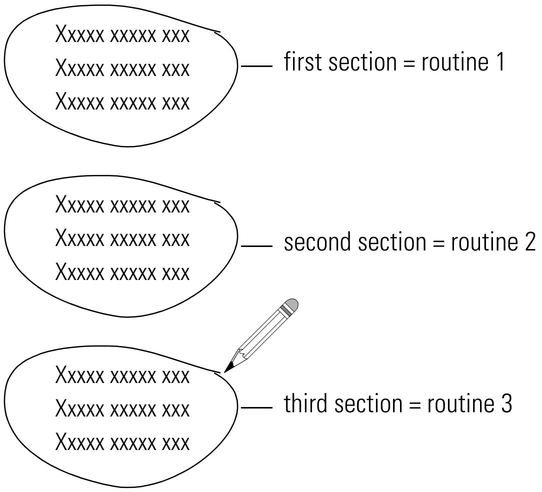
Define a Routine for Each Section of Your Machine or Process

To make your project easier to develop, test, and troubleshoot, divide it into routines (subroutines):

1. Identify each physical section of your machine or process.

2. Assign a routine for each of those sections.

Description of Your Machine or Process



Identify the Programming Languages That Are Installed

To determine which programming languages are installed on your version of RSLogix 5000 software:

1. Start RSLogix 5000 software.
2. From the *Help* menu, choose *About RSLogix 5000*.

To add a programming language, see *ControlLogix Selection Guide*, publication 1756-SG001.

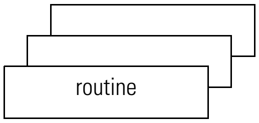
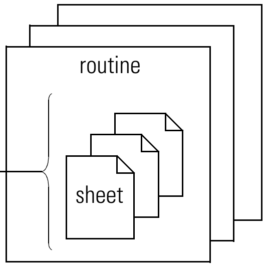
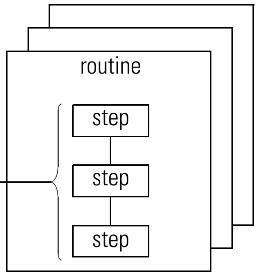
Assign a Programming Language to Each Routine

For each routine, choose a programming language:

- Logix5000 controllers let you use the following languages:
  - ladder logic
  - function block diagram
  - sequential function chart
  - structured text
- Use any combination of the languages in the same project.

In general, if a routine represents:	Then use this language:
continuous or parallel execution of multiple operations (not sequenced)	ladder logic
boolean or bit-based operations	
complex logical operations	
message and communication processing	
machine interlocking	
operations that service or maintenance personnel may have to interpret in order to troubleshoot the machine or process.	
continuous process and drive control	function block diagram (FBD)
loop control	
calculations in circuit flow	
high-level management of multiple operations	sequential function chart (SFC)
repetitive sequences of operations	
batch process	
motion control using structured text	
state machine operations	
complex mathematical operations	structured text
specialized array or table loop processing	
ASCII string handling or protocol processing	

Divide Each Routine Into More Meaningful Increments

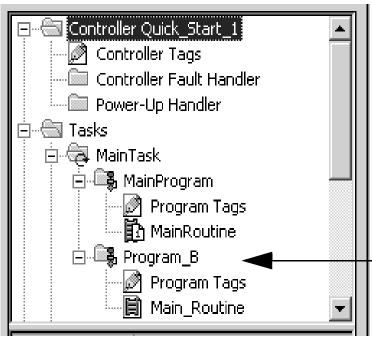
If a routine uses this language:	Then:	Example:
ladder logic structured text	Break up large routines into several smaller routines 	To continuously execute several complex boolean operations… …create a separate routine for each operation.
function block diagram (FBD)	Within the FBD routine, make a sheet for each functional loop for a device (motor, valve, etc.). 	To control 4 valves, where each valve requires feedback that it is in its commanded position… …make a separate sheet for each valve.
sequential function chart (SFC)	Break the SFC into steps. 	To perform the following sequence: 1. Fill a tank. 2. Mix the ingredients in the tank. 3. Empty the tank… …make each section (fill, mix, empty) a separate step.

Assign Main Routines

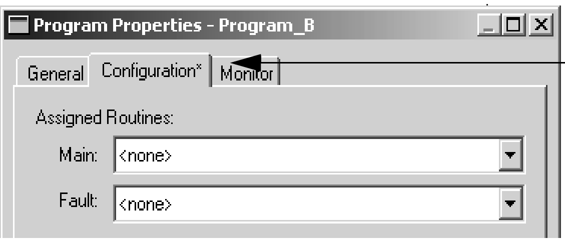
Each program requires a main routine. Once you create your routines, assign a main routine for each program.

IMPORTANT In the default project, *MainProgram* already has a main routine (*MainRoutine*). You have to assign a main routine only for each additional program that you create.

To assign a main routine:



1. Right-click and choose *Properties*.



Main: <none>

Fault: <none>

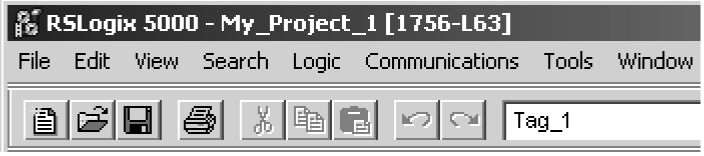
2. Click the *Configuration* tab.

3. Select the main routine.

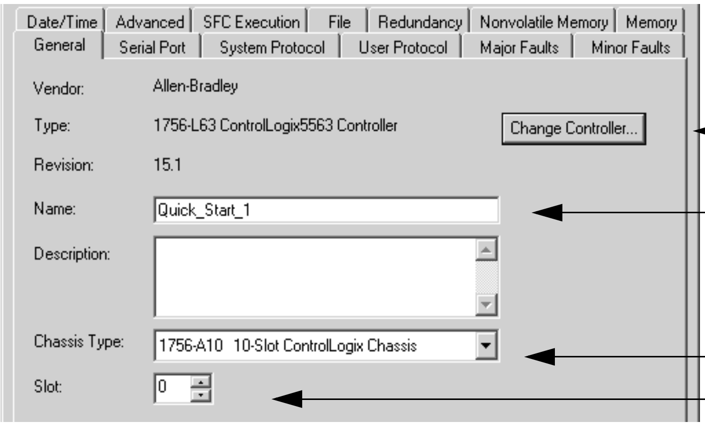
4. Choose OK

Configure the Controller

If you want to change the configuration of the controller, such as name, chassis size, or slot number, use the Controller Properties dialog box.



1. Click the Controller Properties button.



Vendor: Allen-Bradley

Type: 1756-L63 ControlLogix5563 Controller

Revision: 15.1

Name: Quick_Start_1

Description:

Chassis Type: 1756-A10 10-Slot ControlLogix Chassis

Slot: 0

2. Change the required properties (some items apply to only certain controllers).

e. type of controller

f. name of the controller

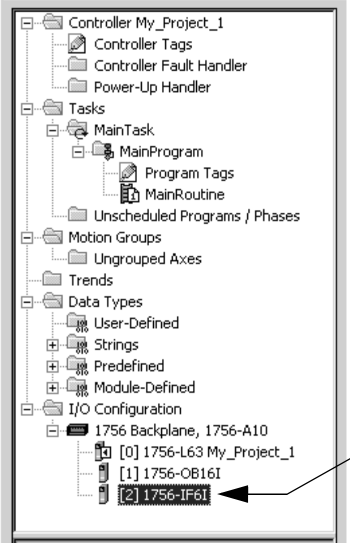
g. chassis size for the controller

h. slot number of the controller

3. Choose OK

Configure I/O Modules

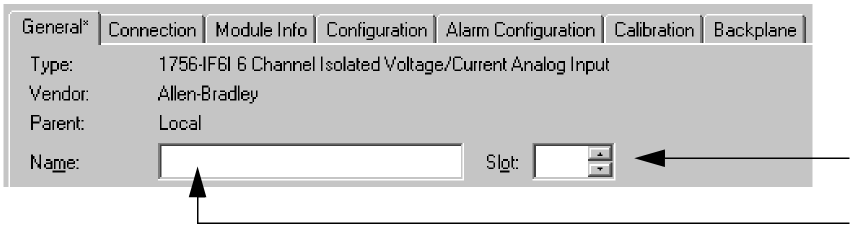
To change the behavior of a module, use the Module Properties window for the module. The configuration options vary from module to module.



Controller My_Project_1
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Unscheduled Programs / Phases
Motion Groups
Ungrouped Axes
Trends
Data Types
User-Defined
Strings
Predefined
Module-Defined
I/O Configuration
1756 Backplane, 1756-A10
[0] 1756-L63 My_Project_1
[1] 1756-OB16I
[2] 1756-IF6I

1. Right-click the module and choose *Properties*.

2. To change the name or slot number, use the *General* tab.

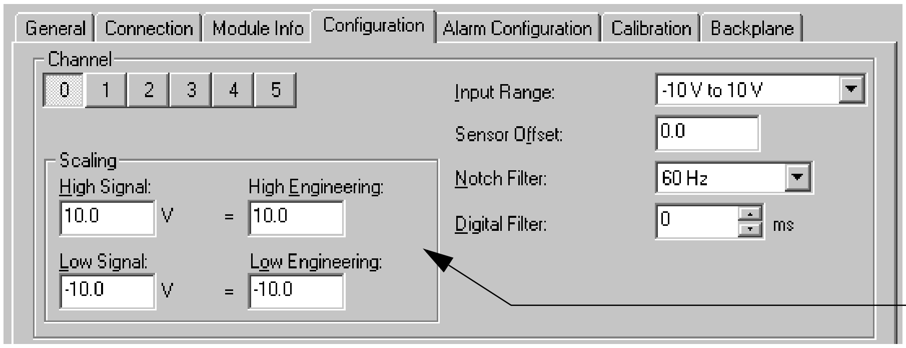


Type: 1756-IF6I 6 Channel Isolated Voltage/Current Analog Input
Vendor: Allen-Bradley
Parent: Local
Name:
Slot:

location of the module in the chassis or rail

name of the module

3. To change the configuration, click the *Configuration* tab. Some modules have several configuration tabs.



High Signal: 10.0 V = High Engineering: 10.0
Low Signal: -10.0 V = Low Engineering: -10.0
Input Range: -10 V to 10 V
Sensor Offset: 0.0
Notch Filter: 60 Hz
Digital Filter: 0 ms

range

scaling

Program a Project Offline

Using This Chapter

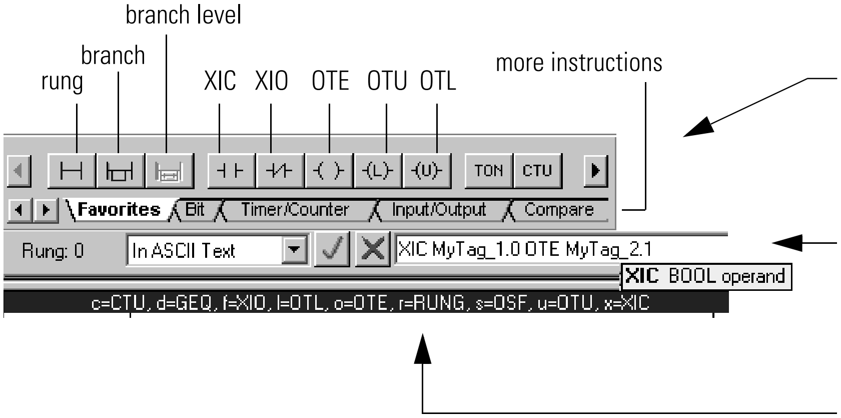
This chapter provides more detailed information on how to program the logic for a routine and create tags for the logic.

If you want to:	See page:
Enter Ladder Logic	3-2
Export/Import Ladder Logic	3-6
Enter a Function Block Diagram	3-9
Use a Faceplate for a Function Block	3-12
Enter Structured Text	3-14
Enter a Sequential Function Chart	3-16
Assign Operands	3-18
Verify a Project	3-20
Review Guidelines for Tags	3-22

In this chapter, you program the project while offline. Online programming requires additional steps. See chapter 6, “Program a Project Online”.

Enter Ladder Logic

To enter ladder logic, you have the following options:



XIC MyTag_1.0 OTE MyTag_2.1

XIC BOOL operand

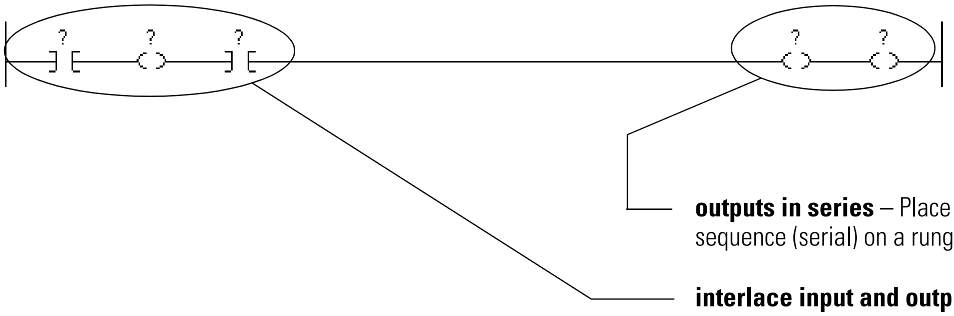
c=CTU, d=GEQ, f=XIO, l=OTL, o=OTE, r=RUNG, s=OSF, u=OTU, x=XIC

drag and drop logic elements – Use the Language Element toolbar to drag and drop a rung, branch, or instruction to your routine.

ASCII text – Use ASCII text to enter or edit logic. A tool tip helps you enter the required operands. ASCII text typically uses the following format:

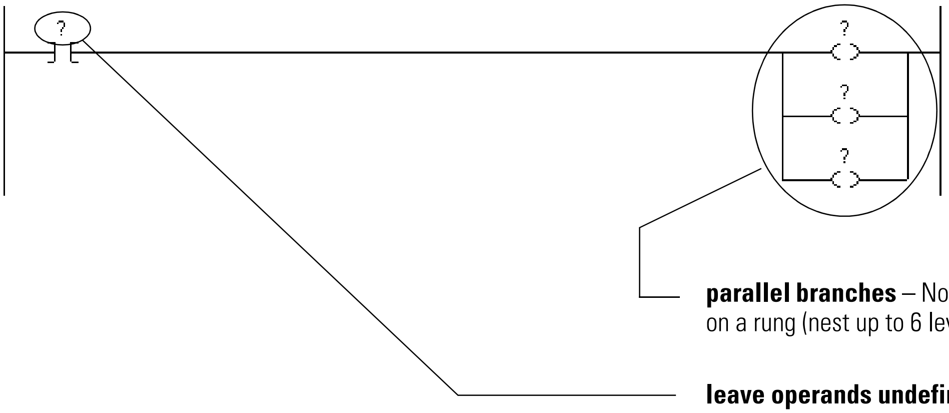
```
mnemonic operand_1 operand_2
```

quick keys – Assign a logic element (rung, branch, instruction) to a keyboard key. To add an element to the right or below the cursor, press the designated key for the element.



outputs in series – Place multiple output instructions in sequence (serial) on a rung.

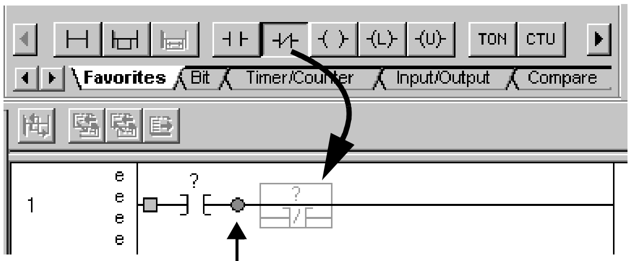
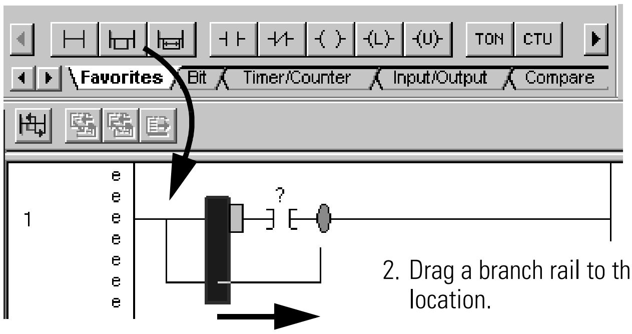
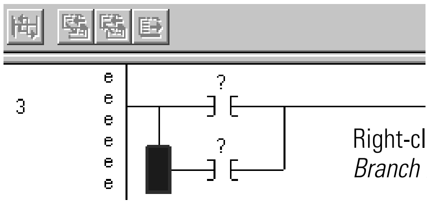
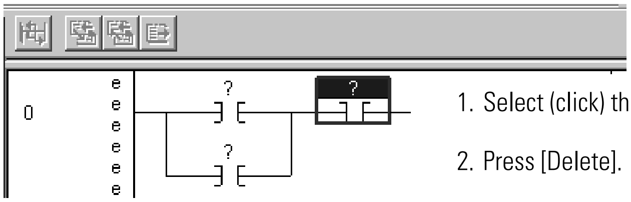
interlace input and output instructions – The last instruction on the rung must be an output instruction.



parallel branches – No limit to the number of parallel branches on a rung (nest up to 6 levels).

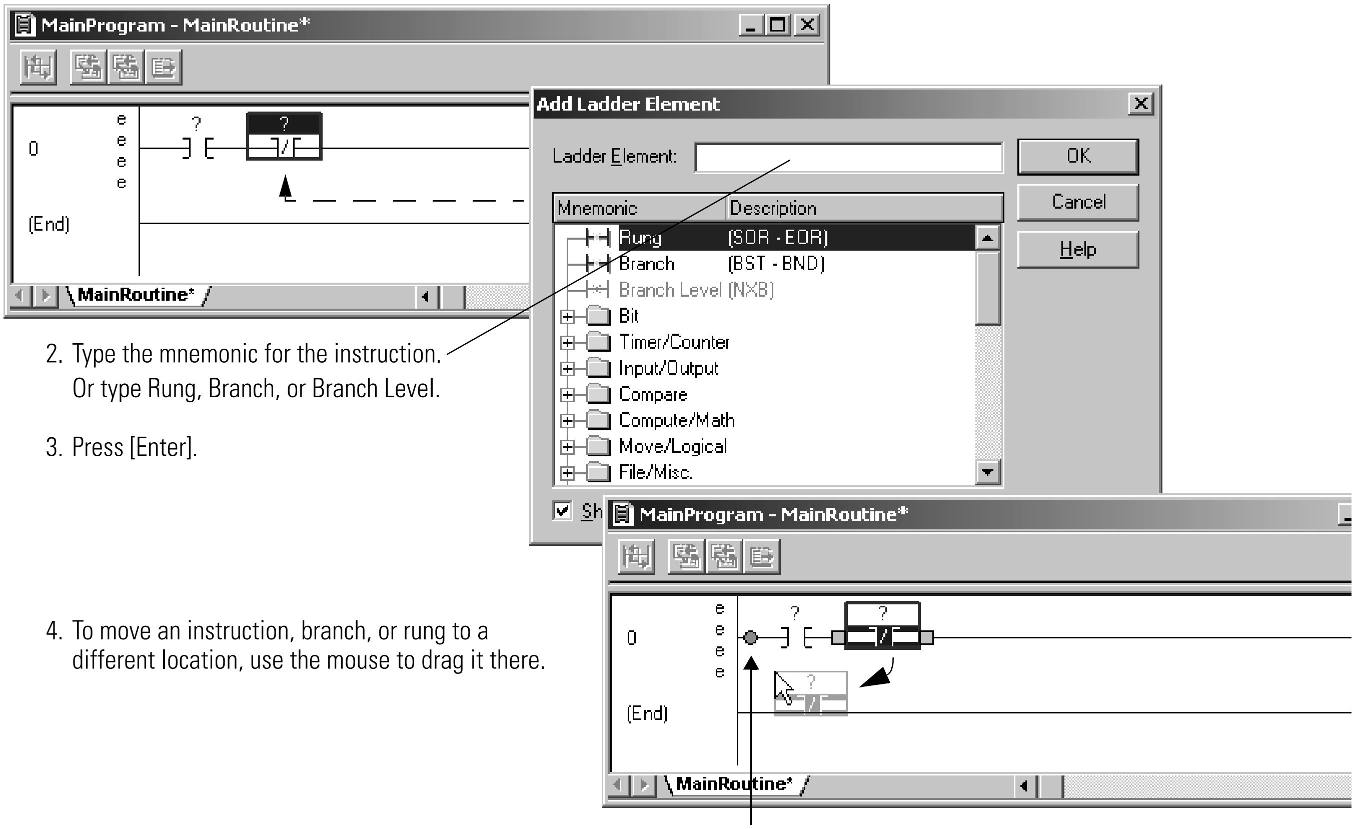
leave operands undefined – enter logic without defining operands. RSLogix 5000 software lets you enter and save logic without assigning operands. This lets you develop your logic in iterations and save libraries of code for re-use.

Drag and Drop an Element

To:	Do this:
add a rung add an instruction	Drag the button for the rung or instruction directly to the desired location.  TON CTU Favorites Bit Timer/Counter Input/Output Compare 1 ? A green dot shows a valid placement location (drop point).
add a branch	1. Drag the branch button to where the branch starts. A green dot shows a valid placement location (drop point).  TON CTU Favorites Bit Timer/Counter Input/Output Compare 1 ? 2. Drag a branch rail to the desired location.
add a level to a branch	 Right-click the branch and choose *Add Branch Level*.
delete an element	 1. Select (click) the element. 2. Press [Delete].

Use the Keyboard to Add an Element

1. Press [Insert].



Ladder Element:

Mnemonic	Description
Rung	(SOR - EOR)
Branch	(BST - BND)
Branch Level	(NXB)
Bit	
Timer/Counter	
Input/Output	
Compare	
Compute/Math	
Move/Logical	
File/Misc.	

2. Type the mnemonic for the instruction. Or type Rung, Branch, or Branch Level.

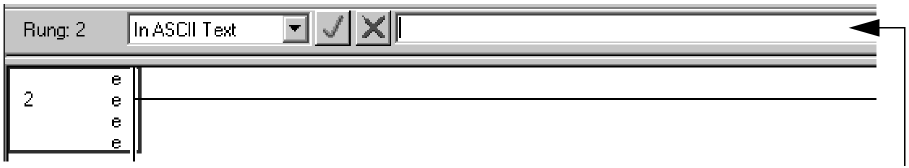
3. Press [Enter].

4. To move an instruction, branch, or rung to a different location, use the mouse to drag it there.

A green dot shows a valid placement location (drop point).

Enter Logic Using ASCII Text

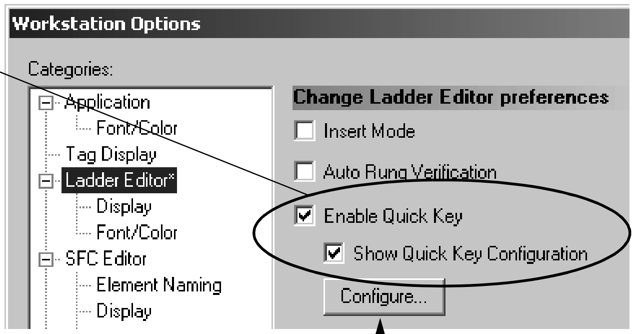
1. Double click the rung.



2. Enter the ASCII

Enable Quick Keys

1. Choose *Tools* ⇒ *Options*.
2. Select (click) *Ladder Editor*.
3. Select (check) these check boxes.



Change Ladder Editor preferences

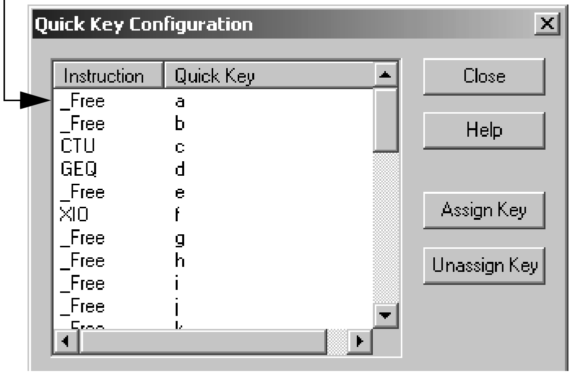
☐ Insert Mode

☐ Auto Rung Verification

☑ Enable Quick Key

☑ Show Quick Key Configuration

4. To assign a key to an element:
   a. Choose Configure...
   b. For the desired key, select the element.
   c. When you have assigned the desired keys, choose Close

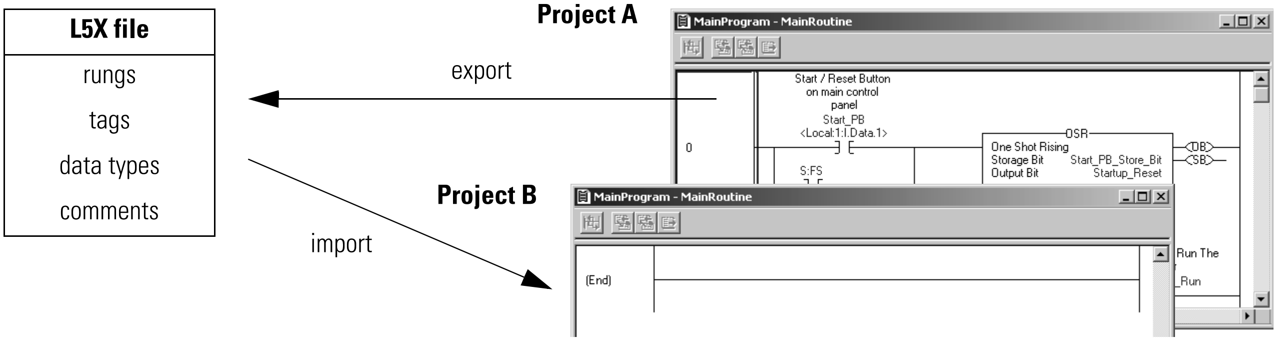


Instruction	Quick Key
_Free	a
_Free	b
CTU	c
GEQ	d
_Free	e
XIO	f
_Free	g
_Free	h
_Free	i
_Free	j
_Free	k

Export/Import Ladder Logic

RSLogix 5000 software 13.0 or later

If you want to re-use ladder logic from another project, simply export the logic to an L5X file and import it into the required project. The L5X file contains all that you need for the logic except I/O modules.



When You Import Rungs…

When you import rungs, RSLogix 5000 software shows a list of the tags and user-defined data types that go along with the rungs. Use the list to manage the tags and data types that are created during the import operation.

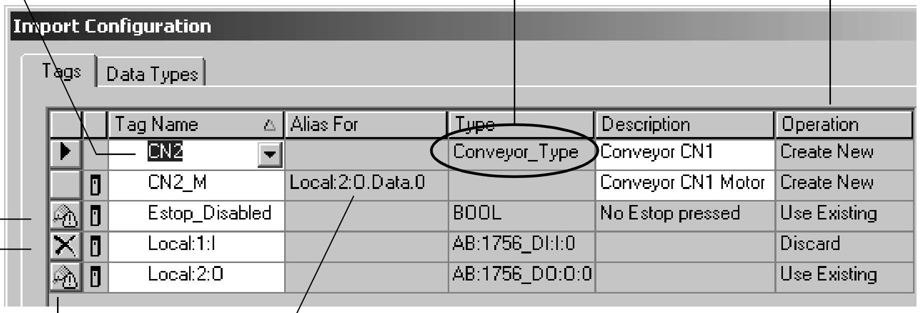
The *Operation* column shows what will happen to each tag and data type during the import. The software either creates it, uses an existing one in the project, or discards it (does not import it).

If desired, you can rename a tag.to make it fit the project better.

If you place the variables for the rungs in a user-defined data type, you have less tags to manage.

If a tag already exists in the project, you can either:

- Use the existing tag, which discards the tag in the library file and binds the logic to the existing tag.
- Rename the tag, which creates a new one.



Tag Name	Alias For	Type	Description	Operation
CN2		Conveyor_Type	Conveyor CN1	Create New
CN2_M	Local:2:O.Data.0		Conveyor CN1 Motor	Create New
Estop_Disabled		BOOL	No Estop pressed	Use Existing
Local:1:I		AB:1756_DI:I:0		Discard
Local:2:O		AB:1756_DO:O:0		Use Existing

No new I/O tags are created.

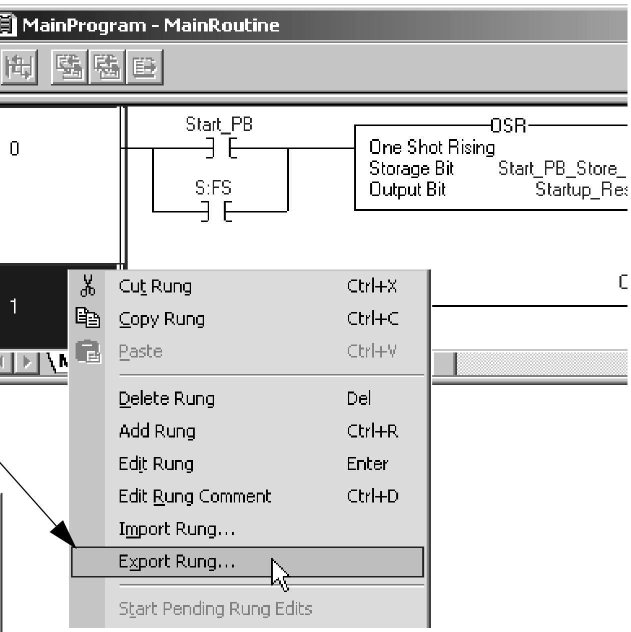
If an I/O tag already exists in the project, the import operation uses this tag for any aliases to that tag name. Once you import a project, make sure you check the alias tags for accuracy.

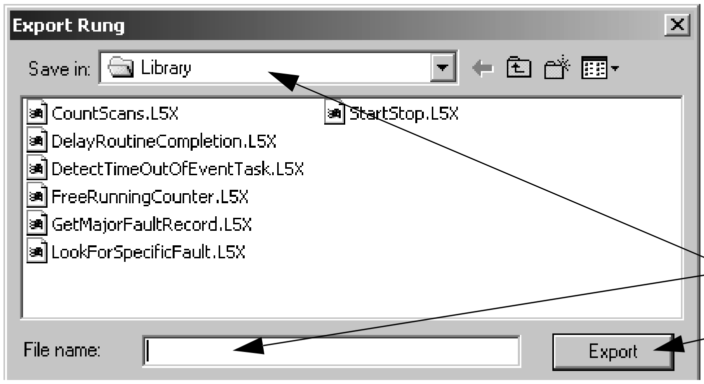
Export Rungs

1. Select the rungs to export:

If rungs are:	Do this:
in sequence	Click the first rung and then [Shift] + click the last rung.
out of sequence	Click the first rung and then [Ctrl] + click each additional rung.

2. Right-click the selection and choose *Export Rung*.

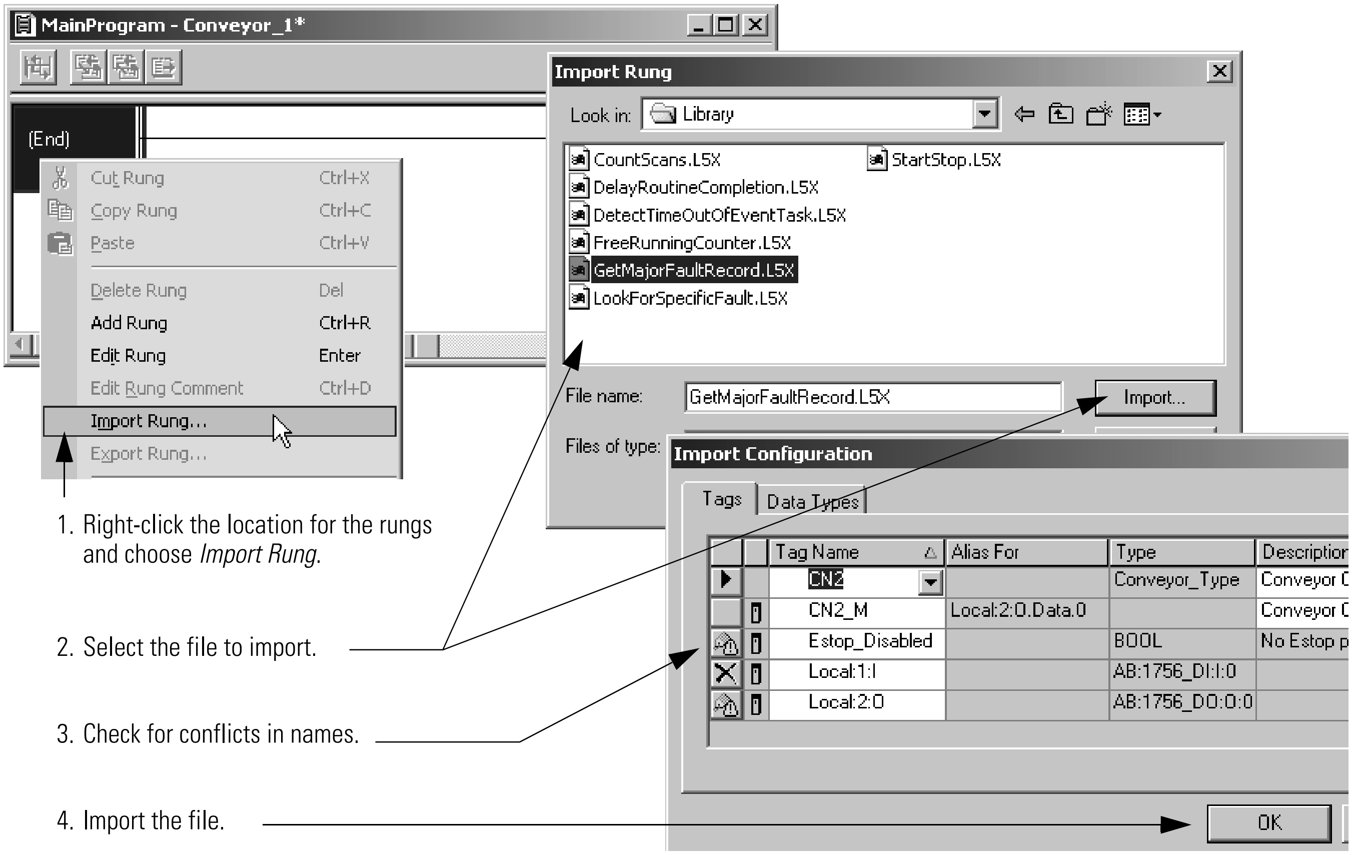




3. Choose a location and name for the file.

4. Create the file.

Import Rungs



File name: GetMajorFaultRecord.L5X

Tag Name	Alias For	Type	Description
CN2		Conveyor_Type	Conveyor C
CN2_M	Local:2:0.Data.0		Conveyor C
Estop_Disabled		BOOL	No Estop p
Local:1:I		AB:1756_DI:I:0	
Local:2:0		AB:1756_DO:0:0	

1. Right-click the location for the rungs and choose *Import Rung*.

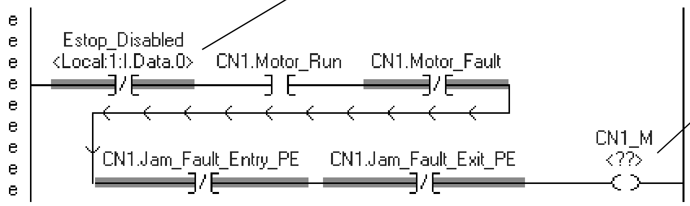
2. Select the file to import.

3. Check for conflicts in names.

4. Import the file.

Check Alias Tags

rungs that you imported

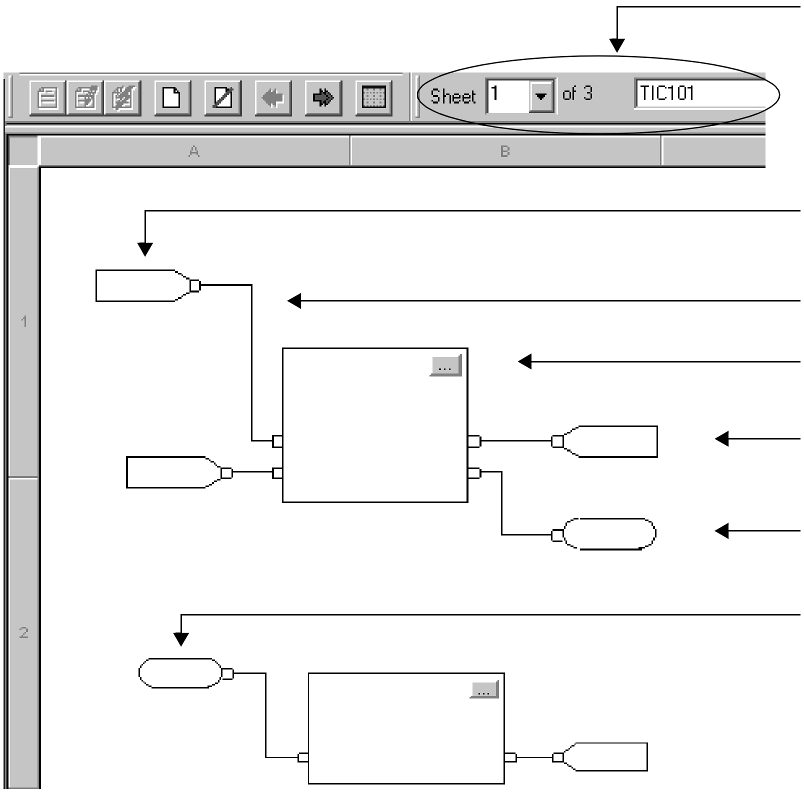


If you import an alias tag, make sure it points to the correct base tag. When a tag is an alias for a tag that already exists in the project, the software sets up the relationship between the alias and base tags.

If the project does not have the base tag, you have to either create the base tag or point the alias to a different base tag.

Enter a Function Block Diagram

A function block diagram lets you visually define the flow of data between instructions. The data flow then drives the execution order of the instructions.



sheet – divide the diagram into sections without effecting execution (When the routine executes, all sheets execute.)

input reference (IREF) – read a value from a tag or set a constant value

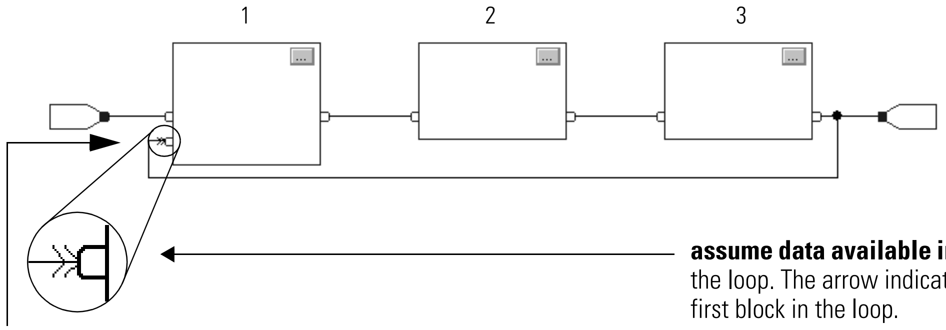
wire – transfer a value between elements

instruction – produce output values based on input values

output reference (OREF) – write a value to a tag

output wire connector (OCON) – write a value to one or more ICONs

input wire connector (ICON) – read a value from an OCON on the same sheet or a different sheet in the routine. To read a value from another routine, use an OREF/IREF combination.



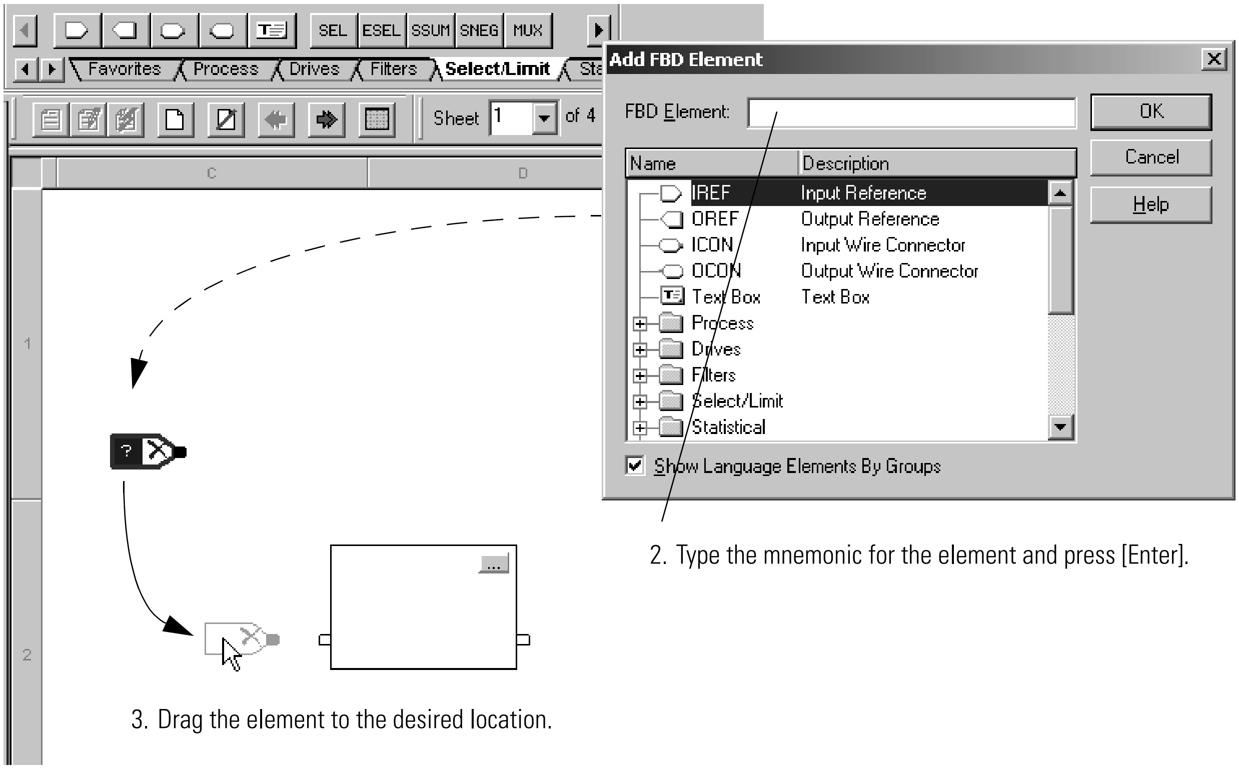
assume data available indicator – define the data flow within the loop. The arrow indicates that the data serves as input to the first block in the loop.

This input pin uses the output that block 3 produced on the previous scan.

If a group of blocks are in a loop, you have to identify which block to execute first. Use the Assume Data Available indicator to mark the input wire that creates the loop (the feedback wire).

Use the Keyboard to Add an Element

1. Press [Insert].



Add FBD Element

FBD Element:

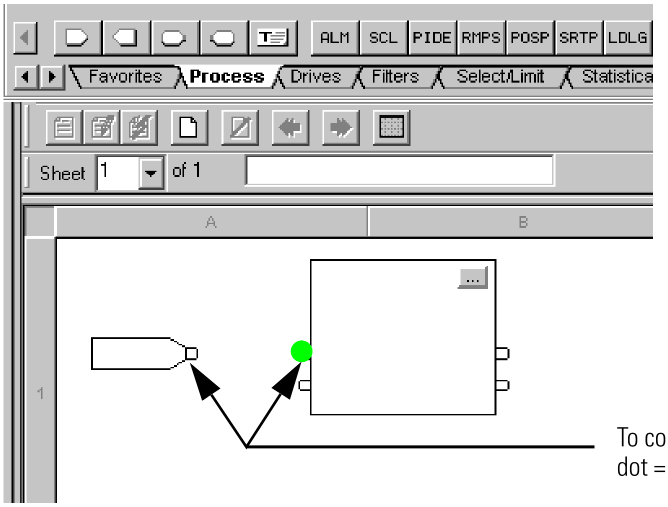
Name	Description
IREF	Input Reference
OREF	Output Reference
ICON	Input Wire Connector
OCON	Output Wire Connector
Text Box	Text Box
Process	
Drives	
Filters	
Select/Limit	
Statistical	

☑ Show Language Elements By Groups

2. Type the mnemonic for the element and press [Enter].

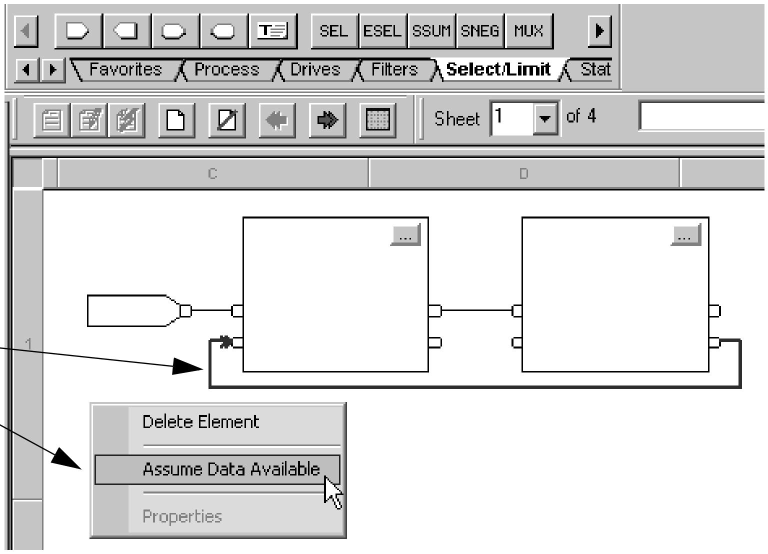
3. Drag the element to the desired location.

Connect Elements



To connect elements, click corresponding pins (green dot = valid connection point).

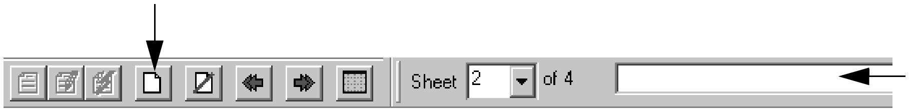
Resolve a Loop



To resolve a loop (define a wire as an input), right-click the wire and choose *Assume Data Available*.

Add Sheet

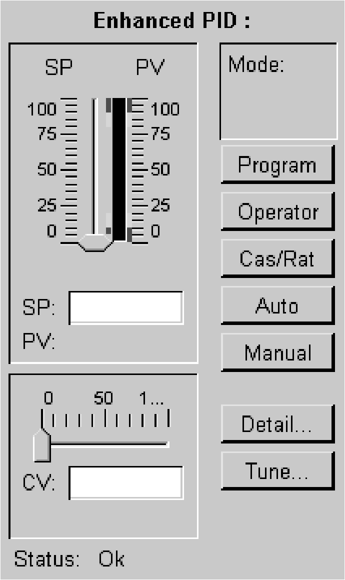
1. Click the New Sheet button.



2. Type a name for the sheet.

Use a Faceplate for a Function Block

RSLogix 5000 software includes faceplates (controls) for some of the function block instructions.



faceplate – Active-X control that lets you interact with a function block instruction.

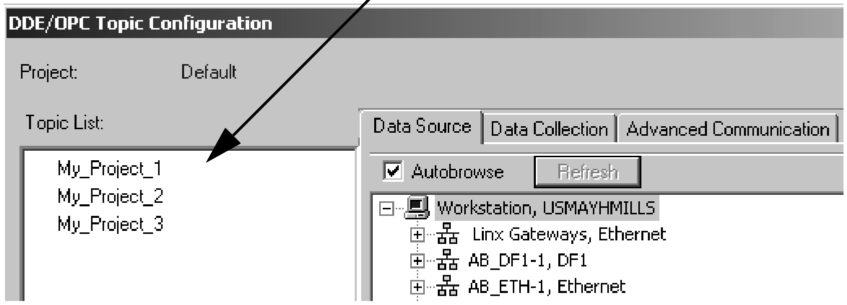
- Your RSLogix 5000 Enterprise Series software package includes the faceplates but *does not* automatically install them. To use the faceplates, locate them on your software CD and install them separately.
- Use faceplates in an Active-X container, such as the following software:
    - RSView®32™
    - RSView® SE
    - Microsoft® Excel
- RSLogix 5000 software is *not* a valid Active-X container.
- Faceplates communicate with the controller via DDE/OPC topics in RSLinx software. To use RSLinx software for DDE/OPC topics, purchase either:
    - RSLinx software as a separate package
    - RSLogix 5000 professional edition software, which includes RSLinx professional edition software

  RSLinx Lite software, which comes with the other RSLogix 5000 software packages, *does not* provide DDE/OPC communication.

Faceplates are available for the following instructions:

- Alarm (ALM)
- Enhanced Select (ESEL)
- Totalizer (TOT)
- Ramp/Soak (RMPS)
- Discrete 2-State Device (D2SD)
- Discrete 3-State Device (D3SD)
- Enhanced PID (PIDE)

topic – In RSLinx software, a topic represents a specific path to a controller.



Project: Default

My_Project_1
My_Project_2
My_Project_3

☑ Autobrowse

Workstation, USMAYHMILLS
Linx Gateways, Ethernet
AB_DF1-1, DF1
AB_ETH-1, Ethernet

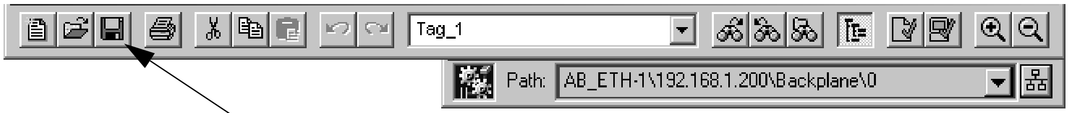
RSLogix 5000 software, revision 10.0 or later, automatically creates an RSLinx topic whenever you:

- create a project
- save a project
- change the revision of a project to 10.0 or later

In some cases, you have to update the data source for the topic in RSLinx software.

Set Up a Topic

1. Use RSLogix 5000 software to create the topic:



Tag_1

Path: AB_ETH-1\192.168.1.200\Backplane\0

a. Set the project path (communication route to the controller).

b. Save the project.

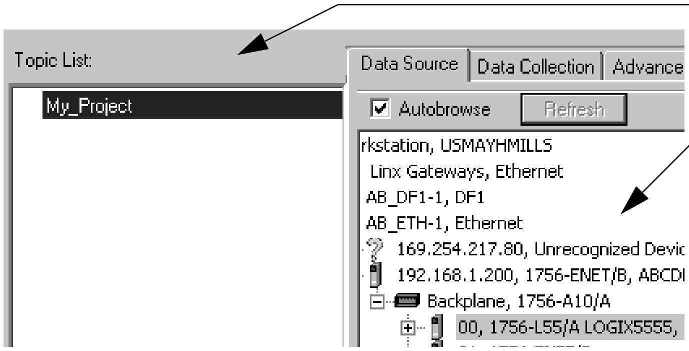
2. In RSLinx software, check the topic:

a. choose *DDE/OPC* ⇒ *Topic Configuration*.

b. Select your project.

c. Make sure the data source points to your controller.

d. Choose Done



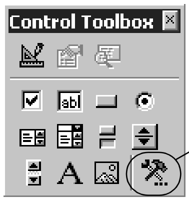
Topic List:

My_Project

☑ Autobrowse

```
rkstation, USMAYHMILLS
 Linx Gateways, Ethernet
AB_DF1-1, DF1
AB_ETH-1, Ethernet
   169.254.217.80, Unrecognized Devic
   192.168.1.200, 1756-ENET/B, ABCDI
  ⊟ Backplane, 1756-A10/A
     ⊞ 00, 1756-L55/A LOGIX5555,
```

Add a Faceplate to Microsoft Excel Software



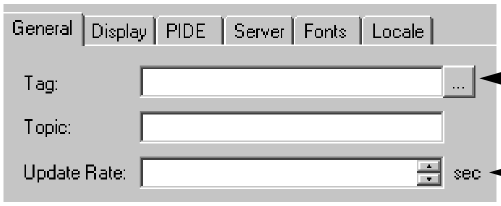
1. Start Microsoft Excel software.

2. Choose *View* ⇒ *Toolbars* ⇒ *Control Toolbox*.

3. Click and select the *Logix 5000…Faceplate Control* that you want.

4. In the location for the faceplate, drag the pointer to the desired size of the faceplate.

5. Right-click the faceplate and choose *Logix 5000…Faceplate Control Object* ⇒ *Properties*.

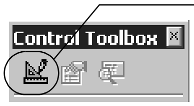


6. Click and browse to the tag that the faceplate controls.

7. Select the update period for the control.

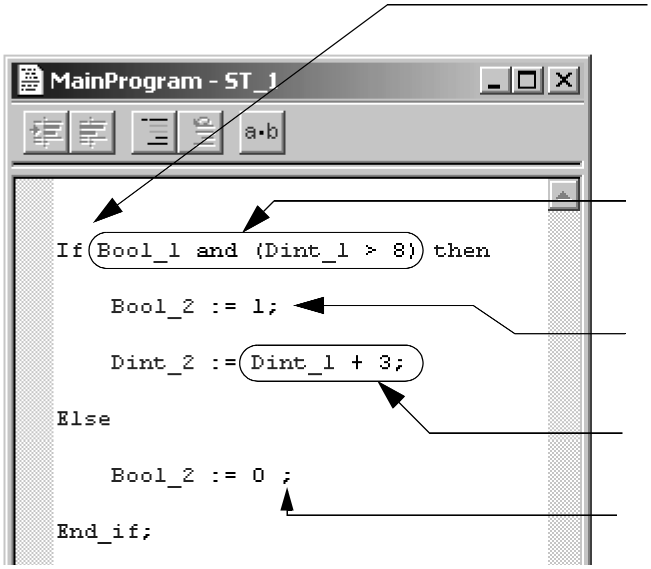
8. Choose OK

9. To exit design mode and use the control, click here.



Enter Structured Text

Structured text is a textual programming language that uses statements to define what to execute. Structured text can contain these components:



```
If Bool_1 and (Dint_1 > 8) then
    Bool_2 := 1;
    Dint_2 := Dint_1 + 3;
Else
    Bool_2 := 0 ;
End_if;
```

construct – define logical conditions for the execution of other structured text code (i.e, other statements). In this example, the construct is If…Then…Else…End_if.

BOOL expression – check if a tag or equation is true or false. A BOOL expression typically serves as the condition for an action (the if, while, or until of a construct).

assignment – write a value to a tag. The value moves from the right side of the := to the left side.

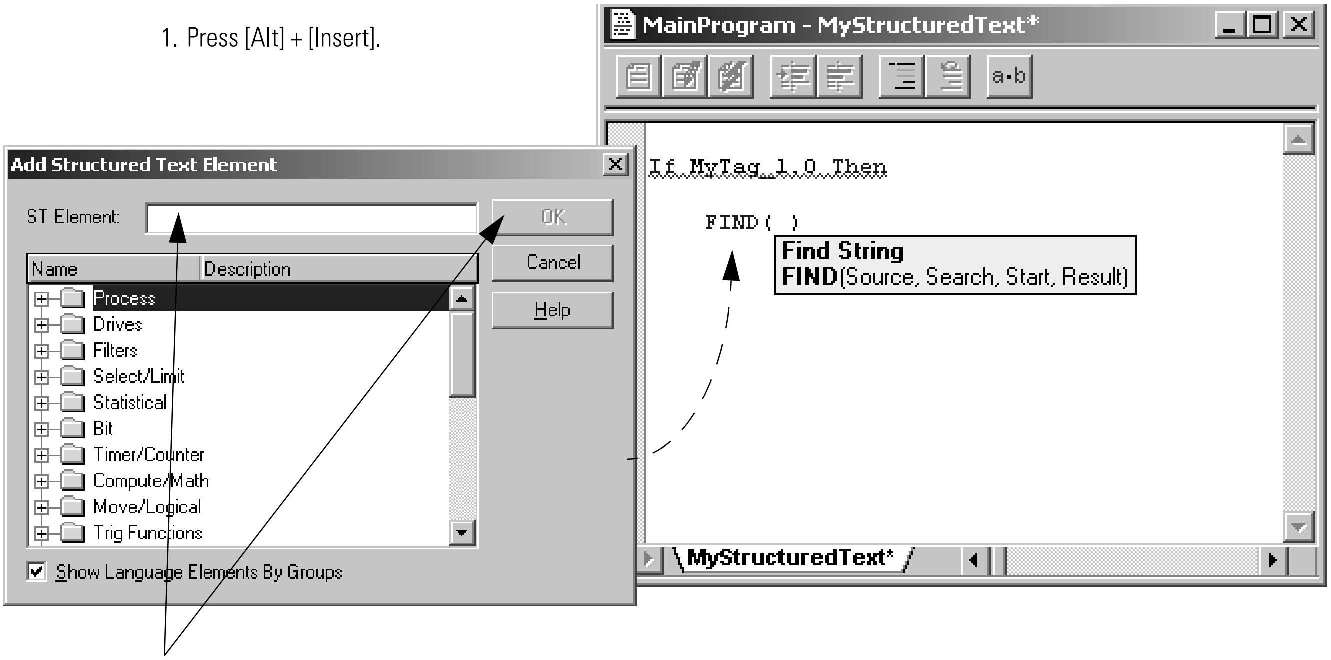
numeric expression– calculate a value.

semi colon ";"– terminate an assignment, instruction, or end of a construct.

As you enter structured text, follow these guidelines:

<table>
<tr><th>Guideline:</th><th>Description:</th></tr>
<tr><td>1. Structured text is <i>not</i> case sensitive.</td><td>Use any combination of upper-case and lower-case letters that makes your text easiest to read. For example, these three variations of "IF" are the same: IF, If, if.</td></tr>
<tr><td>2. Use tabs, spaces, and carriage returns (separate lines) to make your structured text easier to read.</td><td>Tabs, spaces, and carriage returns have no effect on the execution of the structured text.
<table>
<tr><th>This:</th><th>Executes the same as this:</th></tr>
<tr><td><pre>If Bool1 then
    Bool2 := 1;
End_if;</pre></td><td><pre>If Bool1 then Bool2 := 1; End_if;</pre></td></tr>
<tr><td><pre>Bool2 := 1;</pre></td><td><pre>Bool2:=1;</pre></td></tr>
</table></td></tr>
<tr><td>3. Write BOOL expressions as either true or false</td><td>Use a BOOL expression to determine if specific conditions are true (1) or false (0).
<ul><li>A BOOL tag is already true (1) or false (0). <i>Do not</i> use an "=" sign to check its state.</li></ul>
<table>
<tr><th>This is OK:</th><th>This is NOT OK:</th></tr>
<tr><td><code>If Bool1 …</code></td><td><code>If Bool1 = 1 …</code></td></tr>
<tr><td><code>If Not(Bool2) …</code></td><td><code>If Bool2 = 0 …</code></td></tr>
</table>
<ul><li>To check an integer, REAL, or string, make a comparison (=, <, <=, >, >=, <>).</li></ul>
<table>
<tr><th>This is OK:</th><th>This is NOT OK:</th></tr>
<tr><td><code>If Dint1 > 5 …</code></td><td><code>If Dint1 …</code></td></tr>
</table></td></tr>
<tr><td>4. For an assignment, start with the destination.</td><td>Write an assignment as follows:
<pre>Destination := Source;</pre>
← data</td></tr>
</table>

Browse For an Instruction



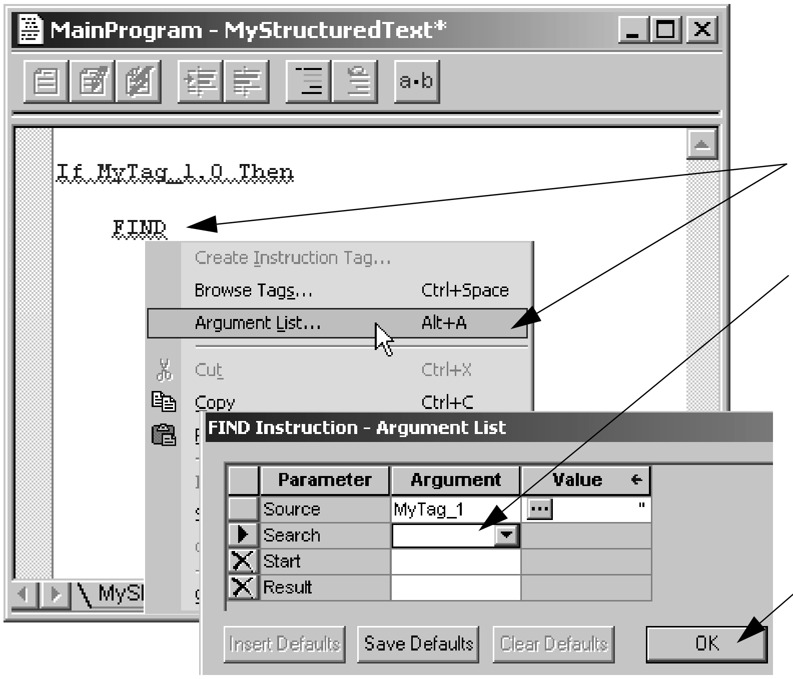
1. Press [Alt] + [Insert].

2. Type the mnemonic for the instruction and press [Enter].

```
If MyTag_1.0 Then

    FIND( )
```

Find String
FIND(Source, Search, Start, Result)

Assign Operands to an Instruction



1. Right-click the instruction and choose *Argument List*.

2. For each parameter, select a tag or type an immediate value.

3. Close the dialog box.

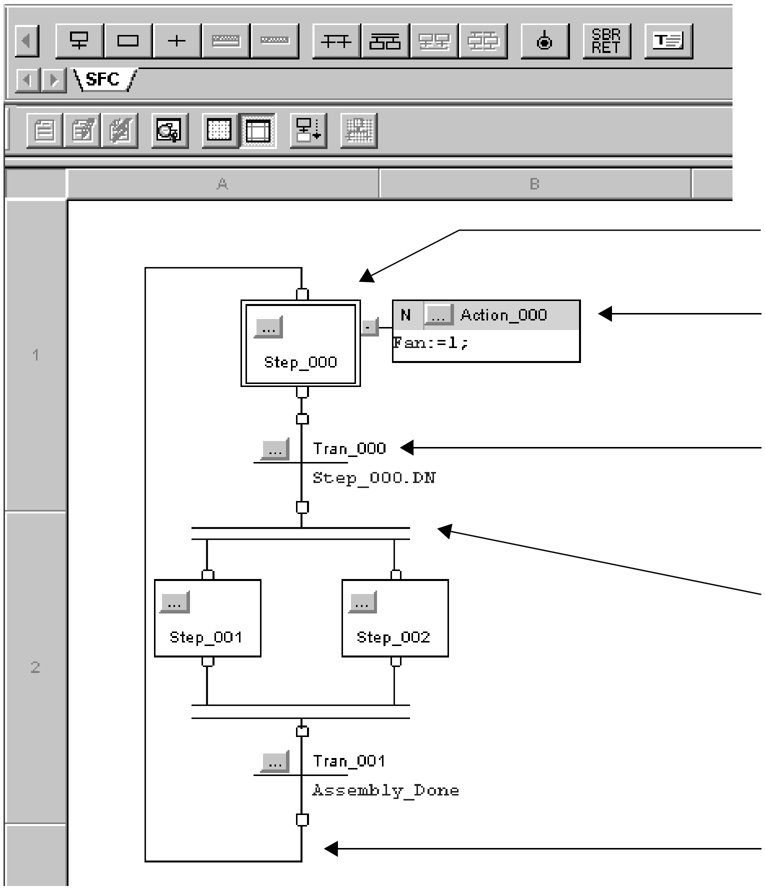
```
If MyTag_1.0 Then

    FIND
```

FIND Instruction - Argument List

	Parameter	Argument	Value
	Source	MyTag_1	''
▶	Search		
☒	Start		
☒	Result		

Enter a Sequential Function Chart

A sequential function chart (SFC) lets you define a sequence of states (steps) through which your machine or process progresses. The steps can execute structured text, call subroutines, or simply serve as signals for other logic.



```
Fan:=1;
```

```
Step_000.DN
```

```
Assembly_Done
```

step – major function of your process. It contains the actions that occur at a particular time, phase, or station.

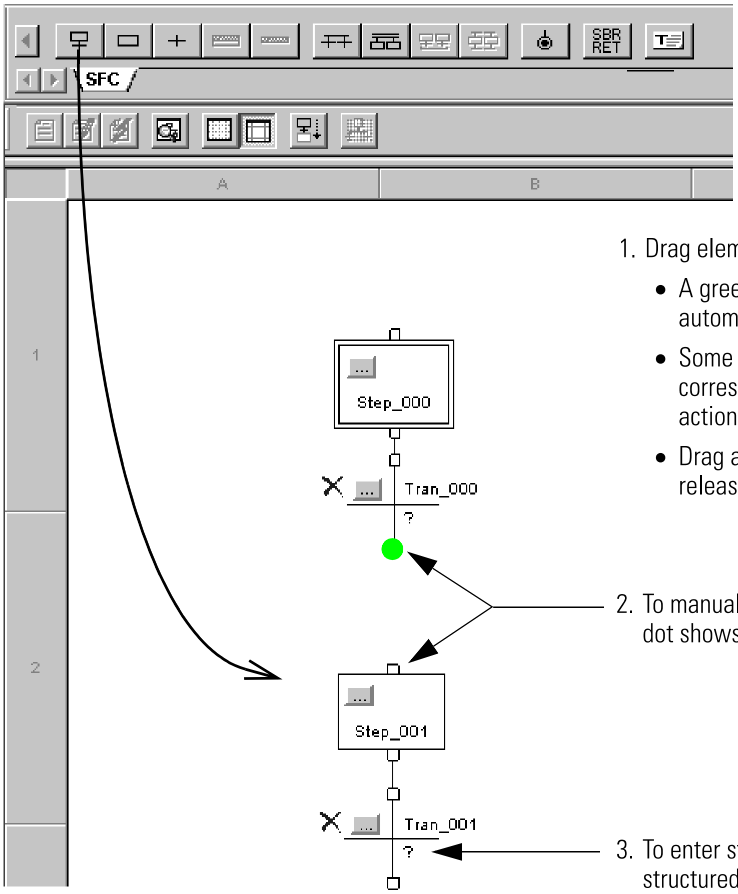
action – one of the functions that a step performs. To program the action, either enter structured text or call a subroutine.

transition – true or false condition that tells the SFC when to go to the next step. To specify the condition, either enter a BOOL expression in structured text or call a subroutine.

branch – execute more than 1 step at the same time (simultaneous) or choose between different steps (selective).

wire – connect one element to another anywhere on the chart.

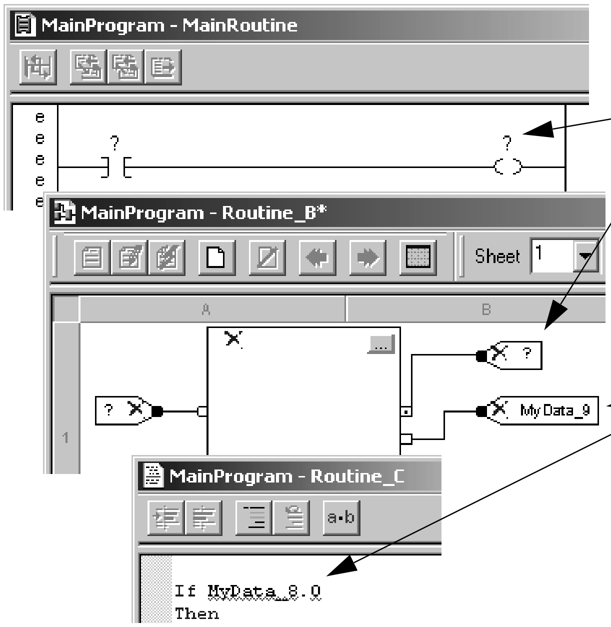
Enter an SFC



1. Drag elements from the toolbar to the chart.
   - A green dot shows a point to which the element will automatically connect if you release the mouse button.
   - Some toolbar buttons are active only after you select a corresponding element on the SFC. For example, to add an action, first select a step.
   - Drag an action until it is on top of the required step and then release the mouse button.
2. To manually connect elements, click corresponding pins. A green dot shows a valid connection point.
3. To enter structured text, double-click a ? symbol. Then type the structured text and press [Ctrl] + [Enter].

Assign Operands

RSLogix 5000 software lets you program according to your workflow. You can enter logic without assigning operands or defining tags. Later, you can go back and assign or define the operands to complete the logic.



```
If MyData_8.0
Then
```

missing operand – enter logic without defining operands. RSLogix 5000 software lets you enter and save logic without assigning operands. This lets you develop your logic in iterations and save libraries of code for re-use.

undefined tag – enter a tag name without defining the tag. RSLogix 5000 software lets you enter and save logic without defining all the operands. This lets you develop your logic in iterations.

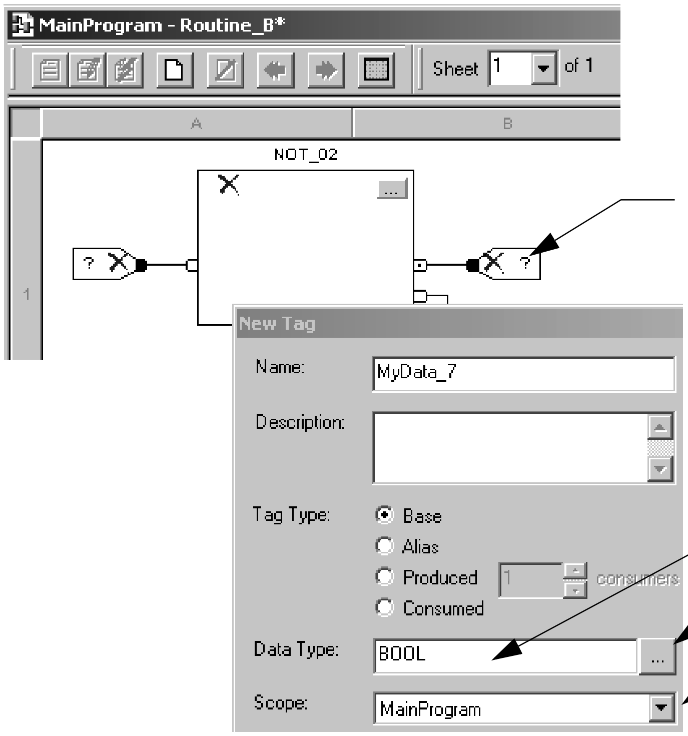
A tag name follows this format:

Name *[Element]* *.Member* *[Element]* *.Bit* or *.[Index]*

▢ = Optional

Where:	Is:
Name	Name that identifies this specific tag.
Element	Subscript or subscripts that point to a specific element within an array. • Use the element identifier only if the tag or member is an array. • Use one subscript for each dimension of the array. For example: [5], [2,8], [3,2,7]. To indirectly (dynamically) reference an element, use a tag or numeric expression that provides the element number. For example, `MyArray[Tag_1], MyArray[Tag_2-1]`, `MyArray[ABS(Tag_3)]`.
Member	Specific member of a structure. • Use the member identifier only if the tag is a structure. • If the structure contains another structure as one of its members, use additional levels of the *.Member* format to identify the required member.
Bit	Specific bit of an integer data type (SINT, INT, or DINT).
Index	To indirectly (dynamically) reference a bit of an integer, use a tag or numeric expression that provides the bit number. For example, `MyTag.[Tag_1], MyTag.[Tag_2-1]`, `MyTag.[ABS(Tag_4)]`.

Create a Tag



New Tag

Name: MyData_7

Description:

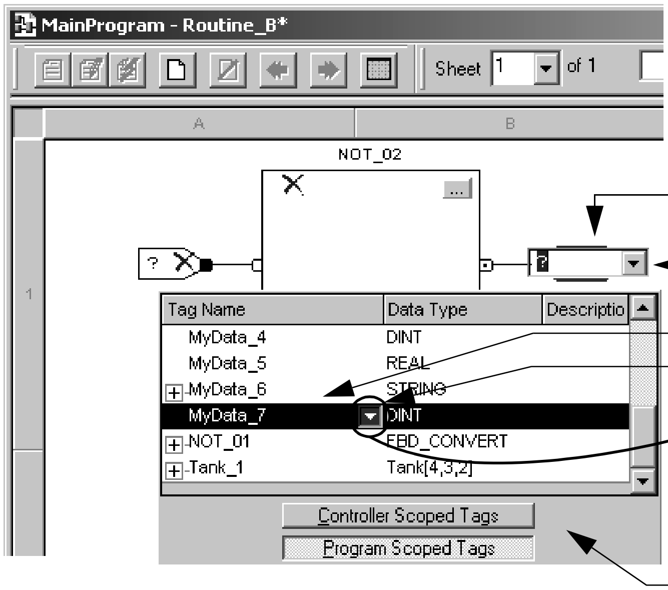
Tag Type: ● Base ○ Alias ○ Produced 1 consumers ○ Consumed

Data Type: BOOL ...

Scope: MainProgram

1. Double-click the tag area.
2. Type a name for the tag and press [Enter]
   Use underscores "_" in place of spaces.
3. Right-click the tag name and choose New "*Tag_Name*"
4. Type the data type.
   To browse for a data type or assign array dimensions, click ⋯.
5. Choose the scope for the tag.
6. Choose OK

Select an Existing Tag



Tag Name	Data Type	Descriptio
MyData_4	DINT	
MyData_5	REAL	
⊞-MyData_6	STRING	
MyData_7	DINT	
⊞-NOT_01	FBD_CONVERT	
⊞-Tank_1	Tank[4,3,2]	

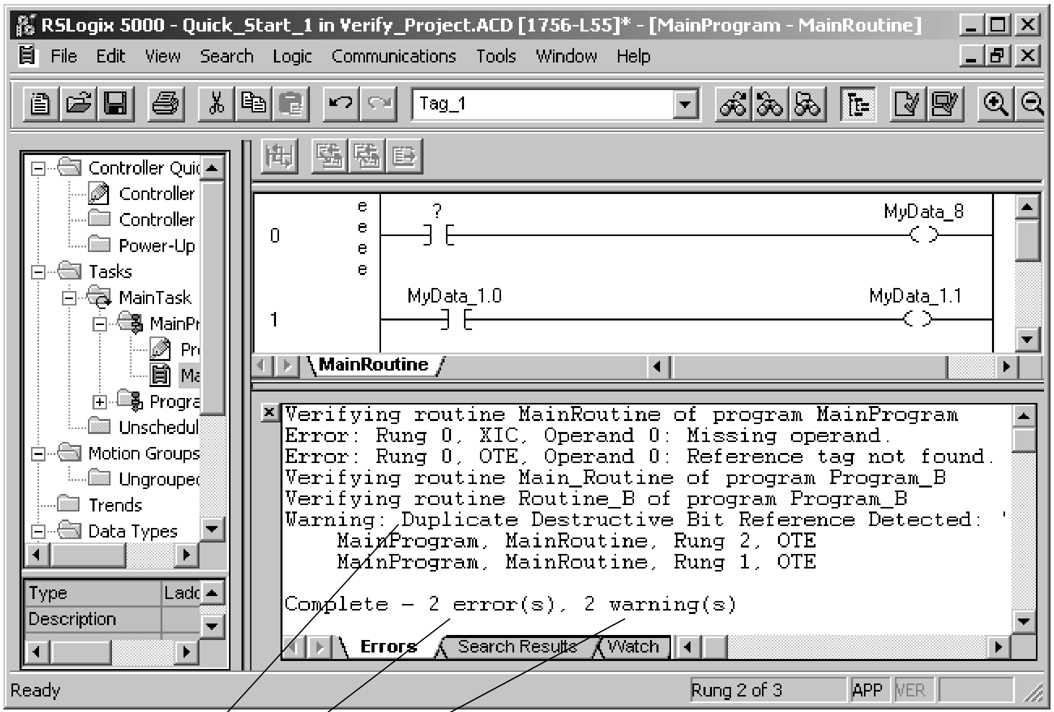
1. Double-click the tag area.
2. Click the ▼.
3. Select the desired tag.
   To select a bit number, click the ▼.

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31

4. To change the scope of tags in which to look, click the appropriate button.

Verify a Project

As you program your project, periodically verify your work:



```
Verifying routine MainRoutine of program MainProgram
Error: Rung 0, XIC, Operand 0: Missing operand.
Error: Rung 0, OTE, Operand 0: Reference tag not found.
Verifying routine Main_Routine of program Program_B
Verifying routine Routine_B of program Program_B
Warning: Duplicate Destructive Bit Reference Detected: '
    MainProgram, MainRoutine, Rung 2, OTE
    MainProgram, MainRoutine, Rung 1, OTE

Complete - 2 error(s), 2 warning(s)
```

verify – check a routine or project for programming errors or incomplete configuration.

warning – situation that may prevent the project from executing as expected. RSLogix 5000 software lets you download a project that contains warnings. Warnings include situations such as duplicate destructive bits and unassigned main routines.

error – situation that you must correct before you download the project. Errors include situations such as missing operands or undefined tags.

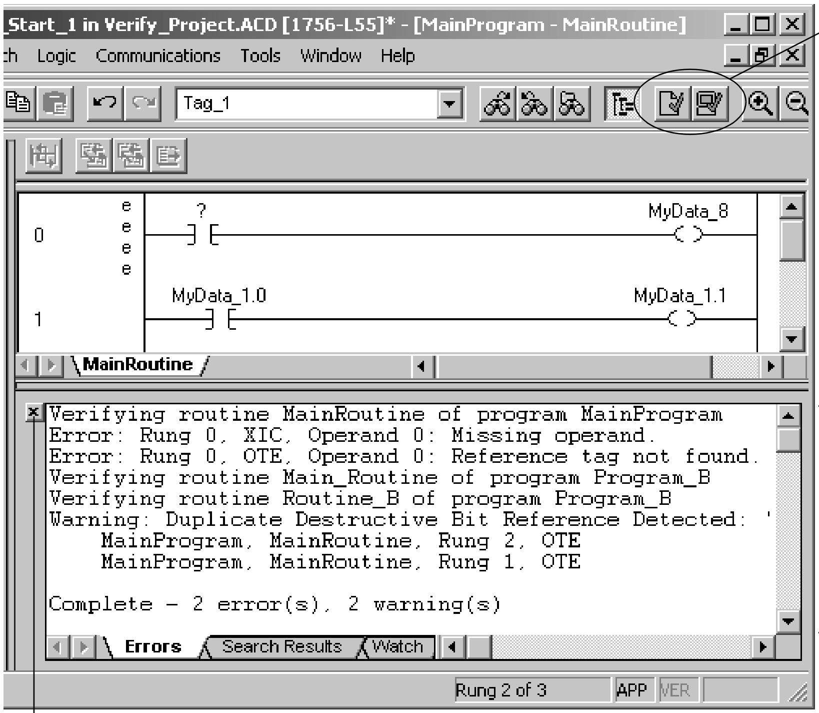
duplicate destructive bit detection – determine if other logic (bit instruction, OREF, ST assignment) also clears or sets the value of a bit that you use in a OTE, ONS, OSF, or OSR instruction. RSLogix 5000 software detects duplicate destructive bits only if *all* of the following conditions are met:

1. You enable duplicate destructive bit detection. (It's off by default.)
2. You use the bit in a ladder logic OTE, ONS, OSF, or OSR instruction.
3. Another logic element such as a bit instruction, OREF, or ST assignment also references that same bit and can change its value.

If you *do not* use a bit in an OTE, ONS, OSF, or OSR instruction, the software does *not* detect any duplicate destructive bits, even if they exist.

By default, duplicate destructive bit detection is turned off.

To verify a routine or project:


_Start_1 in Verify_Project.ACD [1756-L55]* - [MainProgram - MainRoutine]
ch Logic Communications Tools Window Help
Tag_1
0
e
e
e
e
?
MyData_8
1
MyData_1.0
MyData_1.1
MainRoutine
Errors
Search Results
Watch
Rung 2 of 3
APP
VER

```
Verifying routine MainRoutine of program MainProgram
Error: Rung 0, XIC, Operand 0: Missing operand.
Error: Rung 0, OTE, Operand 0: Reference tag not found.
Verifying routine Main_Routine of program Program_B
Verifying routine Routine_B of program Program_B
Warning: Duplicate Destructive Bit Reference Detected: '
    MainProgram, MainRoutine, Rung 2, OTE
    MainProgram, MainRoutine, Rung 1, OTE

Complete - 2 error(s), 2 warning(s)
```

1. Choose a verify option:

   Verify routine in view

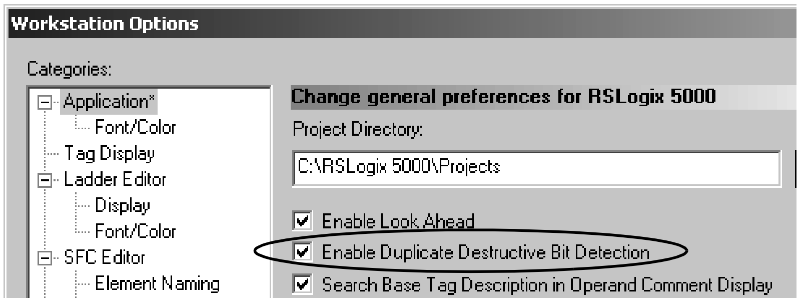
   Verify entire project

2. Go to an error or warning:

To go to:	Do this:
specific error or warning	double-click the error or warning.
cycle through the list of errors and warnings	Press [F4].

3. To close the *Errors* tab, click here.

4. To enable duplicate destructive bit detection (it's off by default), choose *Tools* ⇒ *Options.*



Change general preferences for RSLogix 5000

Project Directory: C:\RSLogix 5000\Projects

☑ Enable Look Ahead

☑ Enable Duplicate Destructive Bit Detection

☑ Search Base Tag Description in Operand Comment Display

Guidelines for Tags

Use the following guidelines to create tags for a Logix5000 project:

<table>
<tr><th></th><th>Guideline:</th><th>Details:</th></tr>
<tr><td>□</td><td>1. Create user-defined data types.</td><td>User-defined data types (structures) let you organize your data to match your machine or process. A user-defined data type provides these advantages:
• One tag contains all the data related to a specific aspect of your system. This keeps related data together and easy to locate, regardless of its data type.
• Each individual piece of data (member) gets a descriptive name. This automatically creates an initial level of documentation for your logic.
• You can use the data type to create multiple tags with the same data lay-out.
For example, use a user-defined data type to store all the parameters for a tank, including temperatures, pressures, valve positions, and preset values. Then create a tag for each of your tanks based on that data type.</td></tr>
<tr><td>□</td><td>2. Use arrays to quickly create a group of similar tags.</td><td>An array creates multiple instances of a data type under a common tag name.
• Arrays let you organize a block of tags that use the same data type and perform a similar function.
• You organize the data in 1, 2, or 3 dimensions to match what the data represents.
For example, use a 2 dimension array to organize the data for a tank farm. Each element of the array represents a single tank. The location of the element within the array represents the geographic location of the tank.
<b>Important:</b> Minimize the use of BOOL arrays. Many array instructions <i>do not</i> operate on BOOL arrays. This makes it more difficult to initialize and clear an array of BOOL data.
• Typically, use a BOOL array for the bit-level objects of a PanelView screen.
• Otherwise, use the individual bits of a DINT tag or an array of DINTs.</td></tr>
<tr><td>□</td><td>3. Take advantage of program-scoped tags.</td><td>If you want multiple tags with the same name, define each tag at the program scope (program tags) for a different program. This lets you re-use both logic and tag names in multiple programs.
Avoid using the same name for both a controller tag and a program tag. Within a program, you cannot reference a controller tag if a tag of the same name exists as a program tag for that program.
Certain tags must be controller scope (controller tag).
<table>
<tr><th>If you want to use the tag:</th><th>Then assign this scope:</th></tr>
<tr><td>in more than one program in the project</td><td>controller scope (controller tags)</td></tr>
<tr><td>in a Message (MSG) instruction</td><td></td></tr>
<tr><td>to produce or consume data</td><td></td></tr>
<tr><td>to communicate with a PanelView terminal</td><td></td></tr>
<tr><td>none of the above</td><td>program scope (program tags)</td></tr>
</table></td></tr>
</table>

<table>
<tr><th></th><th>Guideline:</th><th>Details:</th></tr>
<tr><td>❑</td><td>4. For integers, use the DINT data type.</td><td>To increase the efficiency of your logic, minimize the use of SINT or INT data types. Whenever possible, use the DINT data type for integers.
• A Logix5000 controller typically compares or manipulates values as 32-bit values (DINTs or REALs).
• The controller typically converts a SINT or INT value to a DINT or REAL value before it uses the value.
• If the destination is a SINT or INT tag, the controller typically converts the value back to a SINT or INT value.
• The conversion to or from SINTs or INTs occurs automatically with no extra programming. But it takes extra execution time and memory.</td></tr>
<tr><td>❑</td><td>5. Limit a tag name to 40 characters.</td><td>Here are the rules for a tag name:
• only alphabetic characters (A-Z or a-z), numeric characters (0-9), and underscores (_)
• must start with an alphabetic character or an underscore
• no more than 40 characters
• no consecutive or trailing underscore characters (_)
• not case sensitive</td></tr>
<tr><td>❑</td><td>6. Use mixed case.</td><td>Although tags are not case sensitive (upper case <i>A</i> is the same as lower case <i>a</i>), mixed case is easier to read.
<table>
<tr><th>These tags are easier to read:</th><th>Than these tags:</th></tr>
<tr><td>Tank_1</td><td>TANK_1</td></tr>
<tr><td>Tank1</td><td>TANK1</td></tr>
<tr><td></td><td>tank_1</td></tr>
<tr><td></td><td>tank1</td></tr>
</table></td></tr>
<tr><td>❑</td><td>7. Consider the alphabetical order of tags.</td><td>RSLogix 5000 software displays tags of the same scope in alphabetical order. To make it easier to monitor related tags, use similar starting characters for tags that you want to keep together.</td></tr>
</table>

Starting each tag for a tank with *Tank* keeps the tags together.

Tag Name
Tank_North
Tank_South
...

Otherwise, the tags may end up separated from each other.

Tag Name
North_Tank
...
...
...
South_Tank

other tags that start with the letters *o*, *p*, *q*, etc.

Notes:

Document a Project

Using This Chapter

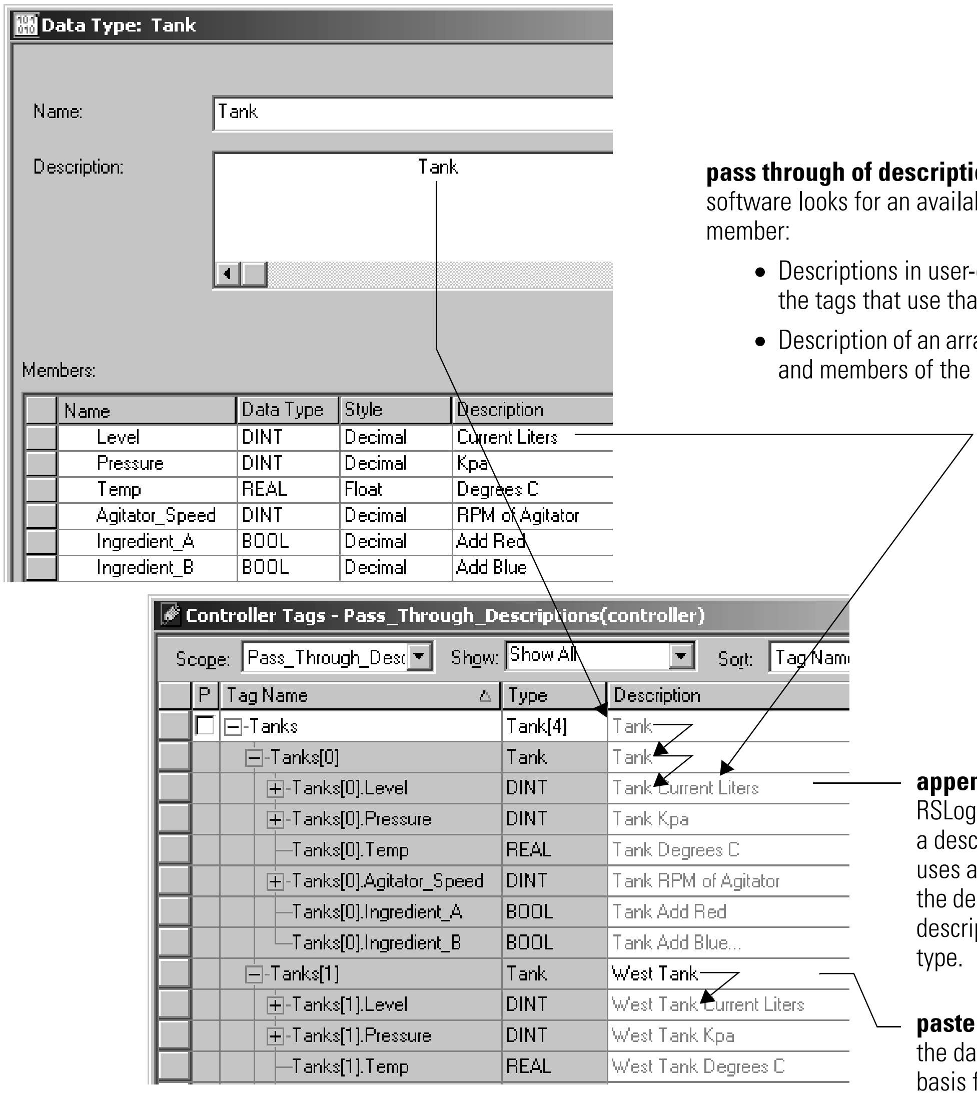
Use this chapter to document your RSLogix 5000 project. This makes the system easier to debug, maintain, and troubleshoot.

Describe a User-Defined Data Type

RSLogix 5000 software 13.0 or later

RSLogix 5000 software lets you automatically build descriptions out of the descriptions in your user-defined data types. This greatly reduces the amount of time you have to spend documenting your project.

As you organize your user-defined data types, keep in mind the following features of RSLogix 5000 software:



Data Type: Tank

Name: Tank

Description: Tank

Members:

Name	Data Type	Style	Description
Level	DINT	Decimal	Current Liters
Pressure	DINT	Decimal	Kpa
Temp	REAL	Float	Degrees C
Agitator_Speed	DINT	Decimal	RPM of Agitator
Ingredient_A	BOOL	Decimal	Add Red
Ingredient_B	BOOL	Decimal	Add Blue

Controller Tags - Pass_Through_Descriptions(controller)

Scope: Pass_Through_Desc Show: Show All Sort: Tag Nam

P	Tag Name	Type	Description
□	⊟-Tanks	Tank[4]	Tank
	⊟-Tanks[0]	Tank	Tank
	⊞-Tanks[0].Level	DINT	Tank Current Liters
	⊞-Tanks[0].Pressure	DINT	Tank Kpa
	-Tanks[0].Temp	REAL	Tank Degrees C
	⊞-Tanks[0].Agitator_Speed	DINT	Tank RPM of Agitator
	-Tanks[0].Ingredient_A	BOOL	Tank Add Red
	-Tanks[0].Ingredient_B	BOOL	Tank Add Blue...
	⊟-Tanks[1]	Tank	West Tank
	⊞-Tanks[1].Level	DINT	West Tank Current Liters
	⊞-Tanks[1].Pressure	DINT	West Tank Kpa
	-Tanks[1].Temp	REAL	West Tank Degrees C

pass through of descriptions – When possible, RSLogix 5000 software looks for an available description for a tag, element, or member:

- Descriptions in user-defined data types ripple through to the tags that use that data type.
- Description of an array tag ripples through to the elements and members of the array.

append description to base tag – RSLogix 5000 software automatically builds a description for each member of a tag that uses a user-defined data type. It starts with the description of the tag and then adds the description of the member from the data type.

paste pass-through description – Use the data type and array description as a basis for more specific descriptions.

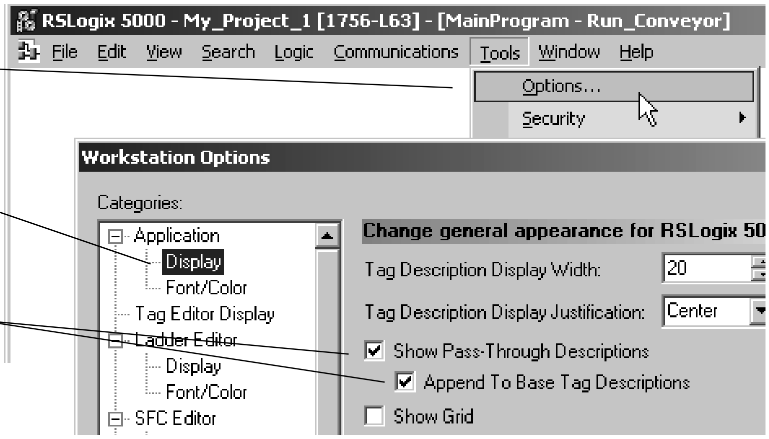
In this example, Tank became West Tank.

RSLogix 5000 software uses different colors for descriptions:

A description in this color:	Is a:
gray	pass-through description
black	manually entered description

Turn Pass-Through and Append Descriptions On or Off

1. In RSLogix 5000 software, choose *Tools ⇒ Options*.
2. Select the *Application ⇒ Display*.
3. Turn on (check) or turn off (uncheck) the desired options.



Change general appearance for RSLogix 50

Tag Description Display Width: 20

Tag Description Display Justification: Center

☑ Show Pass-Through Descriptions

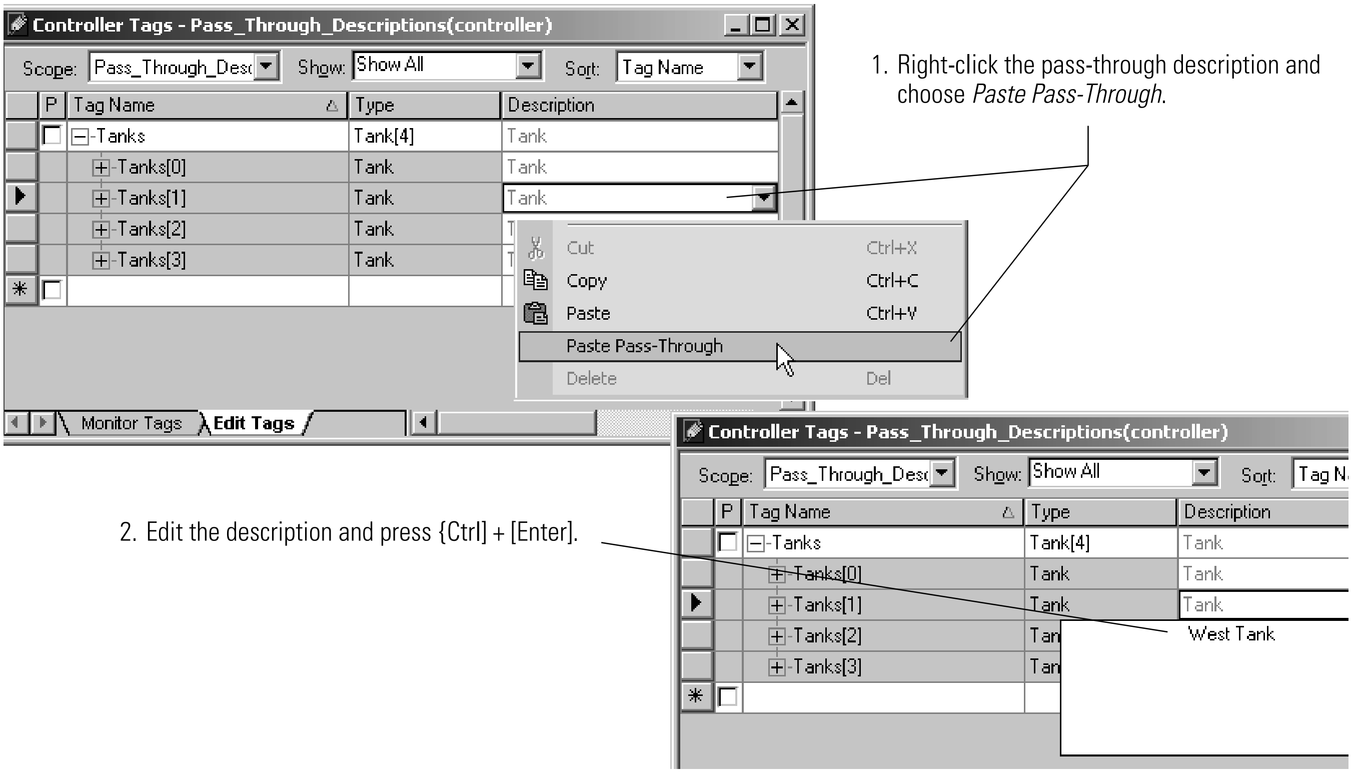
☑ Append To Base Tag Descriptions

☐ Show Grid

Paste a Pass-Through Description

To use a pass-through description as the starting point for a more specific description:

1. Right-click the pass-through description and choose *Paste Pass-Through*.



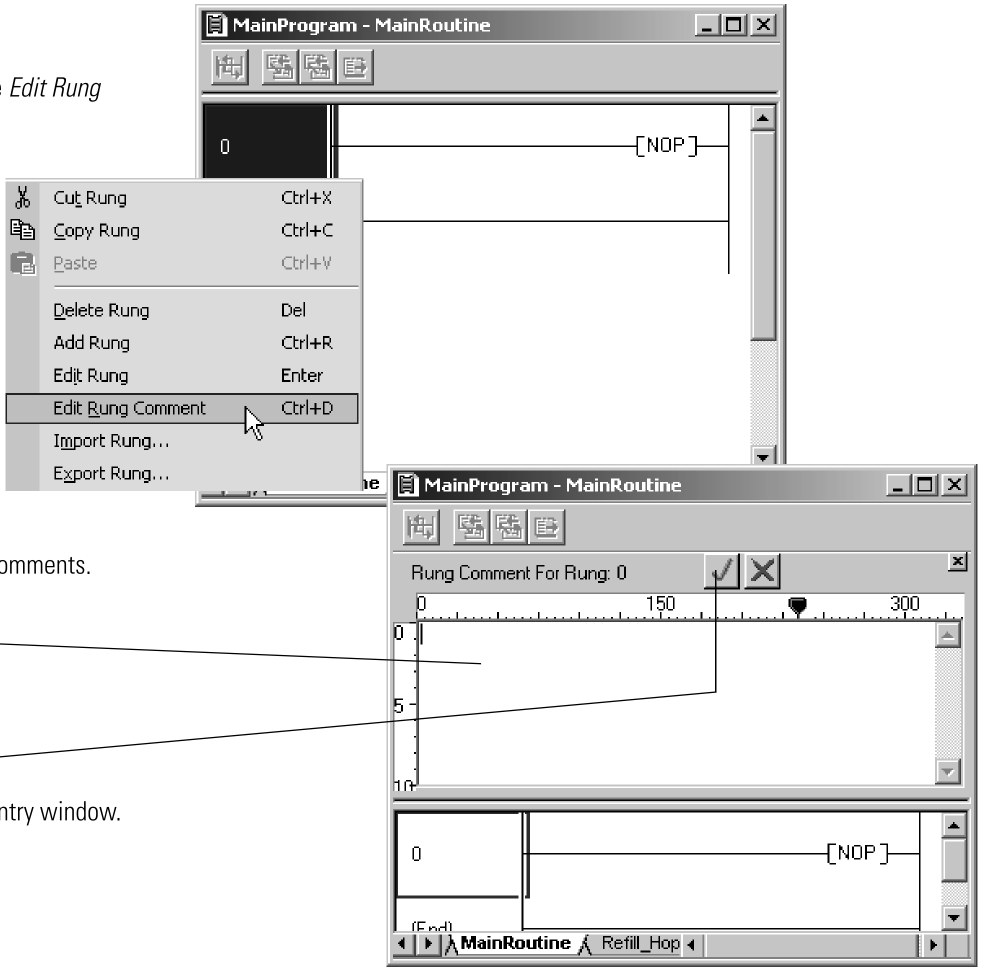
P	Tag Name	Type	Description
☐	⊟-Tanks	Tank[4]	Tank
	⊞-Tanks[0]	Tank	Tank
	⊞-Tanks[1]	Tank	Tank
	⊞-Tanks[2]	Tank	
	⊞-Tanks[3]	Tank	

2. Edit the description and press {Ctrl] + [Enter].

West Tank

Add Rung Comments

Use a rung comment to describe the operation of a rung of ladder logic. You can also start the routine with a rung that contains only a No Operation (NOP) instruction. Add a comment to this initial rung that describes the routine in general.



1. Right-click the rung and choose *Edit Rung Comment*.

2. Type your comments.

3. Close the entry window.

Enter and Edit Rung Comments Using Microsoft® Excel

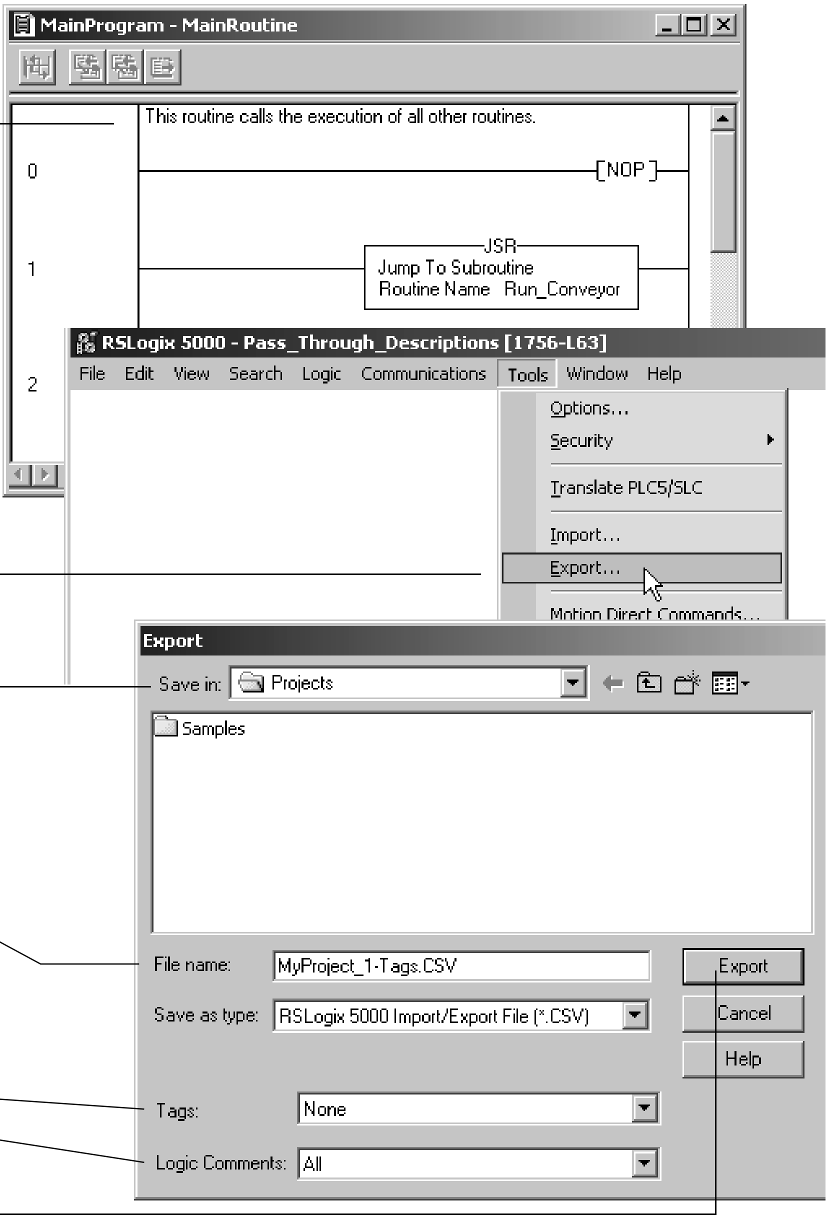
RSLogix 5000 software 13.0 or later

You can also use spreadsheet software such as Microsoft Excel to create and edit rung comments. This lets you take advantage of the editing features in the spreadsheet software.

IMPORTANT Rung comments export in the CSV (comma delimited) format. Make sure you keep that format when you save and close the export file.

Export the Existing Comments

1. In RSLogix 5000 software, add at least 1 rung comment. This helps to format the export file.
2. Choose *Tools* ⇒ *Export*.
3. Note the location and name of the export file.
4. Choose what to export.
5. Export.



This routine calls the execution of all other routines.

Save in: Projects

File name: MyProject_1-Tags.CSV

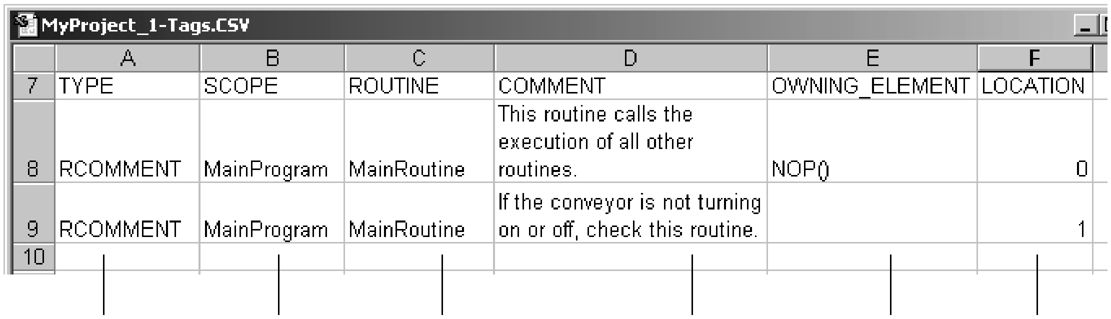
Save as type: RSLogix 5000 Import/Export File (*.CSV)

Tags: None

Logic Comments: All

Edit the Export File

1. In Microsoft Excel software, open the export file.
2. Enter rung comments in the following format:



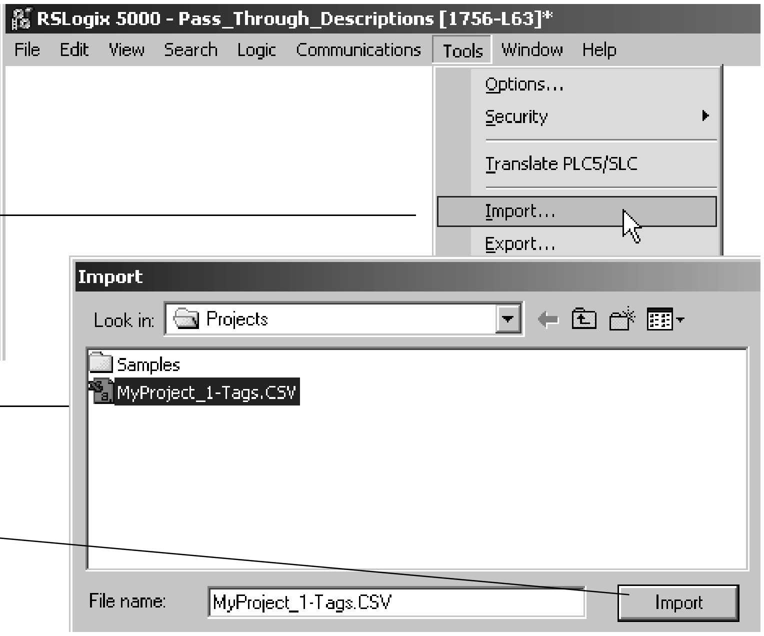
MyProject_1-Tags.CSV

	A	B	C	D	E	F
7	TYPE	SCOPE	ROUTINE	COMMENT	OWNING_ELEMENT	LOCATION
8	RCOMMENT	MainProgram	MainRoutine	This routine calls the execution of all other routines.	NOP()	0
9	RCOMMENT	MainProgram	MainRoutine	If the conveyor is not turning on or off, check this routine.		1
10						

RCOMMENT	program that contains the rung	routine that contains the rung	comments for the rung	leave blank	rung number

3. Save and close the file. (Keep it in the CSV format.)

Import the New Comments

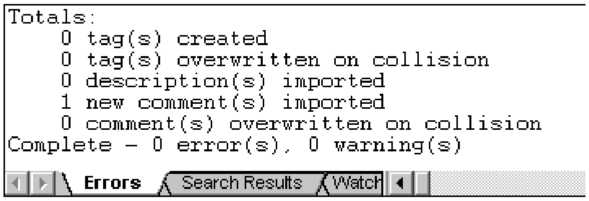


1. In RSLogix 5000 software, choose *Tools ⇒ Import*.

2. Select the file that has the comments you entered (i.e., the export file).

3. Import.

Check the *Errors* tab for the results of the import operation. To refresh the view of the ladder logic and see the comments, close and open the routine.



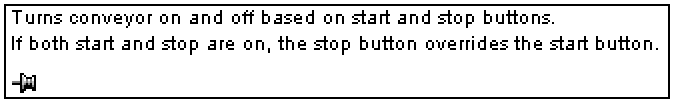
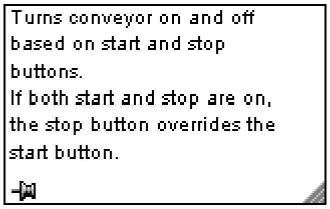
```
Totals:
    0 tag(s) created
    0 tag(s) overwritten on collision
    0 description(s) imported
    1 new comment(s) imported
    0 comment(s) overwritten on collision
Complete - 0 error(s), 0 warning(s)
```

Add Comments to a Function Block Diagram or SFC

Use Text boxes to add notes about the diagram or chart in general or a specific element. Or use a text box to capture information that you will use later on as you develop the project.

Set the Word Wrap Option

Use the word wrap option to control the width of the text box as you type. You set the option for function block diagrams and SFC independent of each other.

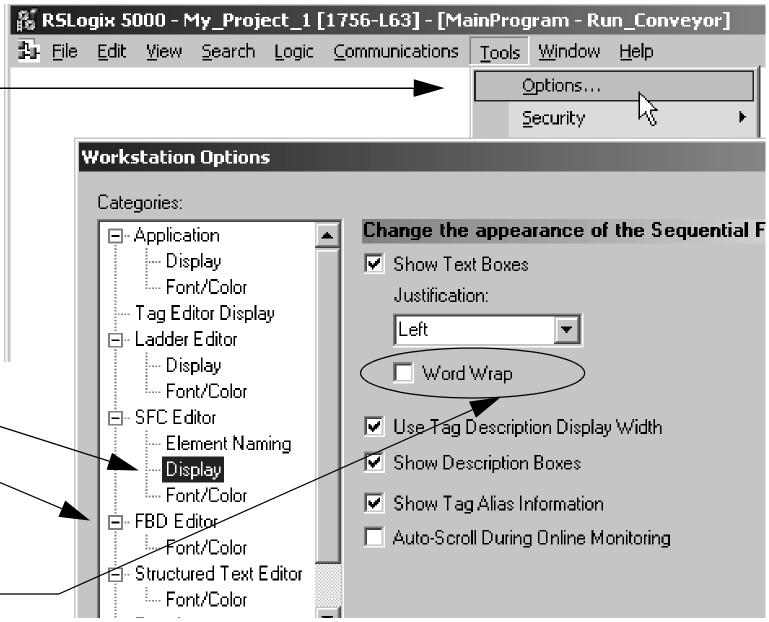
If you want text boxes to:	Then choose this option:
Automatically grow to the width of the longest line of text in the box.  Turns conveyor on and off based on start and stop buttons. If both start and stop are on, the stop button overrides the start button.	☐ Word Wrap
Retain a fixed width and wrap the text. You can always manually resize the box.  Turns conveyor on and off based on start and stop buttons. If both start and stop are on, the stop button overrides the start button.	☑ Word Wrap

To set the word wrap option:

1. In RSLogix 5000 software, choose *Tools* ⇒ *Options*.

2. Select the editor.

3. Select or clear the word wrap option.



☑ Show Text Boxes

Justification: Left

☐ Word Wrap

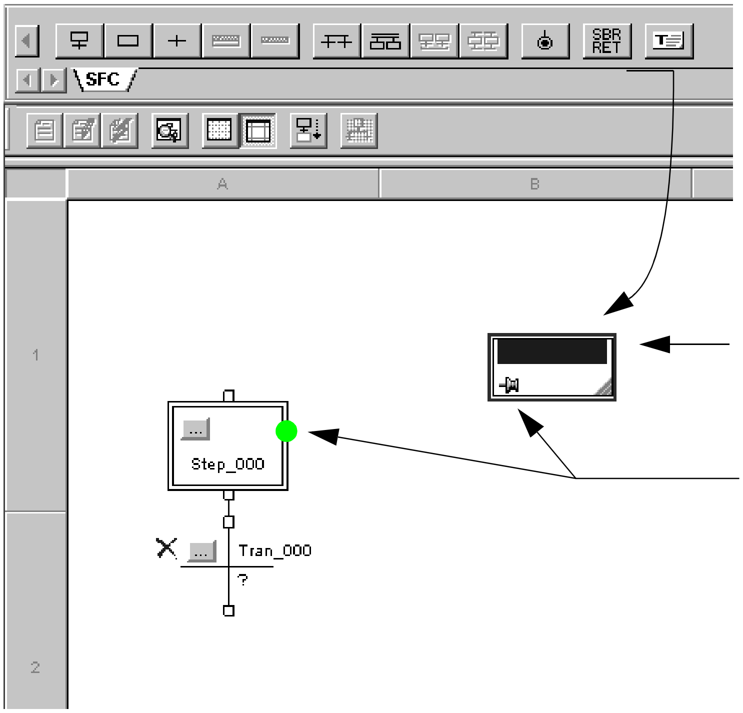
☑ Use Tag Description Display Width

☑ Show Description Boxes

☑ Show Tag Alias Information

☐ Auto-Scroll During Online Monitoring

Add a Text Box



1. Drag the text box button from the toolbar to the chart.
2. Type the comment and press [Ctrl] + [Enter]
3. To attach the text box to a specific element, click the pin symbol and then the corresponding element. A green dot shows a valid connection point.

Add Comments to Structured Text

To make your structured text easier to interpret, add comments. Comments:

- let you use plain language to describe how your structured text works
- download to the controller and upload from the controller
- *do not* affect the execution of the structured text

To add comments to your structured text:

To add a comment:	Use one of these formats:
on a single line	//comment (*comment*) /*comment*/
at the end of a line of structured text	
within a line of structured text	(*comment*) /*comment*/
that spans more than one line	(*start of comment . . . end of comment*) /*start of comment . . . end of comment*/

For example:

Format:	Example:

//comment	**At the beginning of a line**
	//Check conveyor belt direction
	IF conveyor_direction THEN...
	At the end of a line
	ELSE //If conveyor isn’t moving, set alarm light
	light := 1;
	END_IF;

(*comment*)	Sugar.Inlet[:=]1;(*open the inlet*)
	IF Sugar.Low (*low level LS*)& Sugar.High (*high level LS*)THEN...
	(*Controls the speed of the recirculation pump. The speed depends on the temperature in the tank.*)
	IF tank.temp > 200 THEN...

/*comment*/	Sugar.Inlet:=0;/*close the inlet*/
	IF bar_code=65 /*A*/ THEN...
	/*Gets the number of elements in the Inventory array and stores the value in the Inventory_Items tag*/
	SIZE(Inventory,0,Inventory_Items);

Notes:

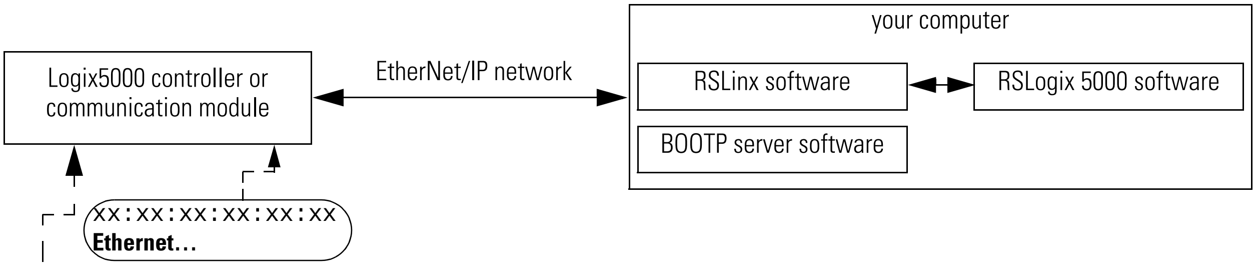
Go Online to the Controller

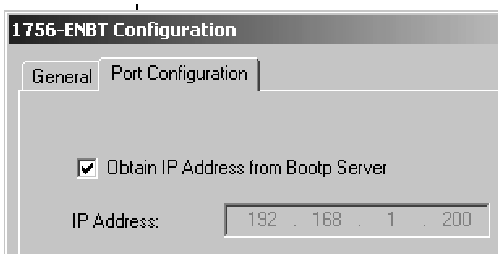
Using This Chapter

Use this chapter to access the project in the controller so you can monitor, edit, or troubleshoot the controller.

Establish EtherNet/IP Communication with the Controller

RSLinx® software handles communication between Logix5000 controllers and your software programs, such as RSLogix 5000 software. To communicate with a controller (e.g., download, monitor data), configure RSLinx software for the required communication.





☑ Obtain IP Address from Bootp Server

IP Address: 192 . 168 . 1 . 200

ethernet address (MAC) – address that is assigned to a module at the factory.

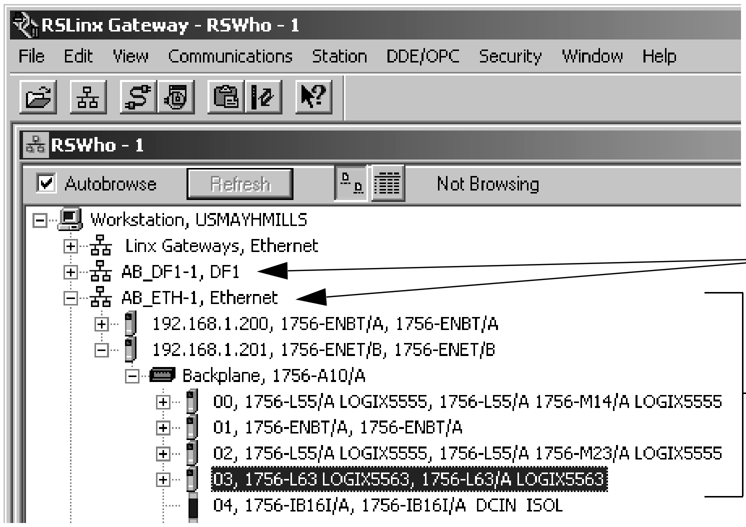
- The module always keeps its ethernet address.
- To determine the ethernet address of a device, look for a sticker on the device.
- An ethernet address uses this format: `xx:xx:xx:xx:xx:xx`

IP address – address that you assign to a module for communication over a specific ethernet network. An IP address uses this format:

`xxx.xxx.xxx.xxx`

BOOTP – configure a device to request an IP address over an ethernet network from a BOOTP server. Out of the box, Allen-Bradley EtherNet/IP devices are configured for BOOTP.

BOOTP server – software program that receives BOOTP requests from ethernet devices and assigns IP addresses. RSLinx software revision 2.40 and later includes BOOTP server software.


RSLinx Gateway - RSWho - 1
File Edit View Communications Station DDE/OPC Security Window Help
RSWho - 1
Refresh

☑ Autobrowse Not Browsing

```
⊟ Workstation, USMAYHMILLS
  ⊞ Linx Gateways, Ethernet
  ⊞ AB_DF1-1, DF1
  ⊟ AB_ETH-1, Ethernet
    ⊞ 192.168.1.200, 1756-ENBT/A, 1756-ENBT/A
    ⊟ 192.168.1.201, 1756-ENET/B, 1756-ENET/B
      ⊟ Backplane, 1756-A10/A
        ⊞ 00, 1756-L55/A LOGIX5555, 1756-L55/A 1756-M14/A LOGIX5555
        ⊞ 01, 1756-ENBT/A, 1756-ENBT/A
        ⊞ 02, 1756-L55/A LOGIX5555, 1756-L55/A 1756-M23/A LOGIX5555
        ⊞ 03, 1756-L63 LOGIX5563, 1756-L63/A LOGIX5563
          04, 1756-IB16I/A, 1756-IB16I/A DCIN ISOL
```

driver – establish communication over a specific network.

path – communication route to a device. To define a path, you expand a driver and select the device.

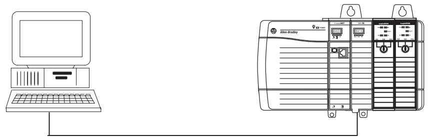
Equipment and Information That You Need

1. Depending on your controller, you may need a communication module or daughter card:

If you have this controller:	Then install this:	In this location:
1756 ControlLogix controller	1756-ENBT 10/100 Mbps EtherNet/IP Bridge module	open slot in the same chassis as the controller
1769-L35E CompactLogix controller	no additional communication module or card is required.	
1794 FlexLogix controller	1788-ENBT communication daughter card	open slot in the controller

2. Determine if your EtherNet/IP network is connected to the Internet or if it is a standalone network that does not connect to the Internet?

   The graphic below shows a simple standalone network.



3. For the EtherNet/IP device (controller, bridge module, or daughter card), obtain the following:

Obtain this:	If your network is connected to the Internet, from this source	If your network is a standalone network that does not connect to the Internet, from this source
ethernet address	sticker on the device	sticker on the device
IP address	network administrator	192.168.1.x, where x = any value between 1 and 254[1]
subnet mask		255.255.255.0[2]
gateway address (may not be required)		Not needed

[1] In this case, your computer must use an IP address that is close to the EtherNet/IP device's IP address. For example, if the EtherNet/IP device uses the 192.168.1.x addressing, the computer must also use that addressing but with a different x value.

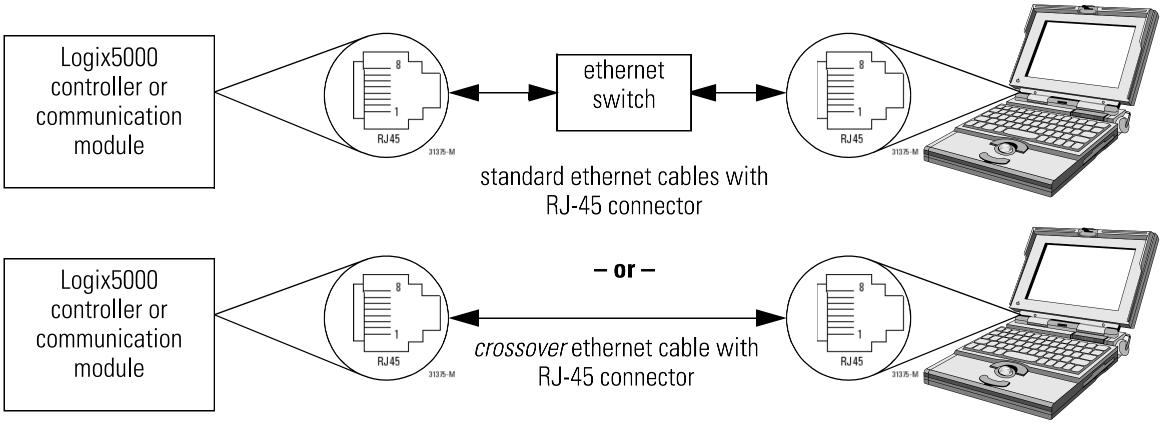
[2] In this case, your computer must use the same subnet mask value as the EtherNet/IP device.

Connect Your EtherNet/IP Device and Computer

WARNING

If you connect or disconnect the communications cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Connect your EtherNet/IP device and computer via ethernet cable.

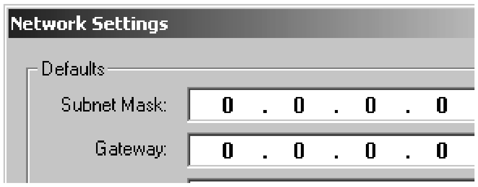

Logix5000 controller or communication module
8
1
RJ45
31375-M
ethernet switch
8
1
RJ45
31375-M
standard ethernet cables with RJ-45 connector
Logix5000 controller or communication module
8
1
RJ45
31375-M
– or –
crossover ethernet cable with RJ-45 connector
8
1
RJ45
31375-M

Assign an IP Address to the Controller or Communication Module

If you *do not* have a serial connection to the controller…

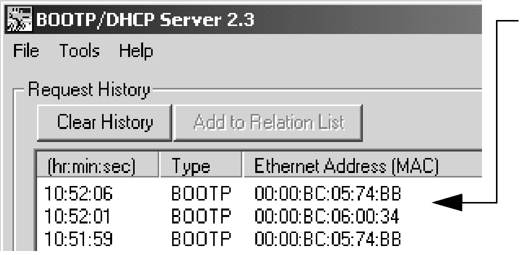
1. Start BOOTP server software:

   Start ⇒ Programs ⇒ Rockwell Software ⇒ BOOTP-DHCP Server ⇒ BOOTP-DHCP Server
   – or –
   Start ⇒ Programs ⇒ Rockwell Software ⇒ RSLinx Tools ⇒ BOOTP-DHCP Server.



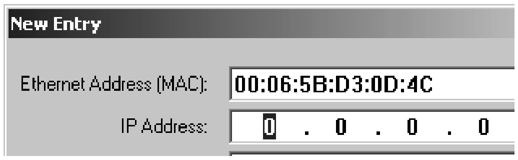
Subnet Mask: 0 . 0 . 0 . 0
Gateway: 0 . 0 . 0 . 0

2. If this is the first time you are using the software, type the subnet mask and gateway (if required) for your network and then choose OK



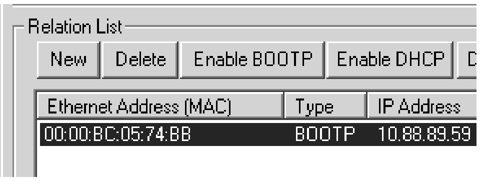
(hr:min:sec)	Type	Ethernet Address (MAC)
10:52:06	BOOTP	00:00:BC:05:74:BB
10:52:01	BOOTP	00:00:BC:06:00:34
10:51:59	BOOTP	00:00:BC:05:74:BB

3. Double click the ethernet address of the controller/communication module.



Ethernet Address (MAC): 00:06:5B:D3:0D:4C
IP Address: 0 . 0 . 0 . 0

4. Type the IP address and choose OK



Ethernet Address (MAC)	Type	IP Address
00:00:BC:05:74:BB	BOOTP	10.88.89.59

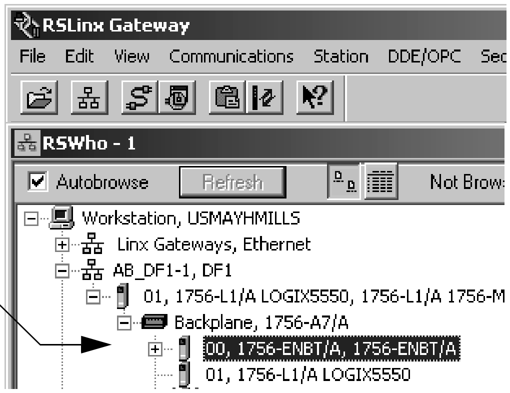
5. In the Relation List (lower section), select the device and choose Disable BOOTP/DHCP.

   This lets the device keep the address even after a power cycle.

6. When you close the BOOTP server software, you are prompted to save your changes.
   - If you want a record of the IP address that you assigned to the device, save the changes.
   - Regardless of whether you save the changes, the device keeps the IP address.

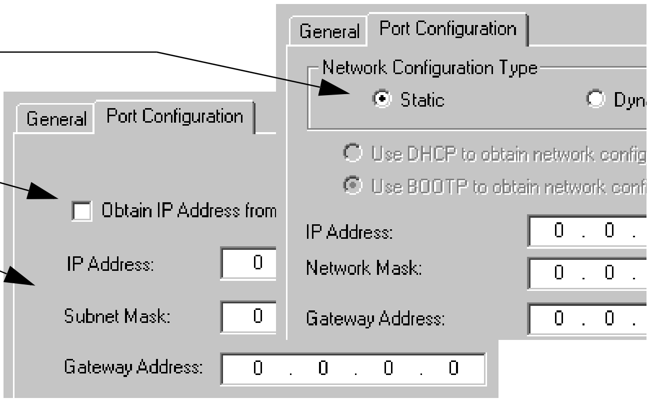
If you have a serial connection to the controller…

1. Start RSLinx software.
2. Click ☷.
3. Browse to the EtherNet/IP device.
   To open a level, click the + sign.
4. Right-click the device and choose *Module Configuration*.
5. Click the Port Configuration tab.



Workstation, USMAYHMILLS
Linx Gateways, Ethernet
AB_DF1-1, DF1
01, 1756-L1/A LOGIX5550, 1756-L1/A 1756-M
Backplane, 1756-A7/A
00, 1756-ENBT/A, 1756-ENBT/A
01, 1756-L1/A LOGIX5550

6. Depending on your device, either:
   - Select the *Static* button.
   - Clear (uncheck) the *Obtain IP Address from Bootp Server* check box.
7. Type the:
   - IP address
   - subnet mask
   - gateway address (if required).
8. Choose OK and then Yes (yes—change IP address).



● Static ○ Dyn
○ Use DHCP to obtain network config
● Use BOOTP to obtain network conf
IP Address: 0 . 0 .
Network Mask: 0 . 0 .
Gateway Address: 0 . 0 .

☐ Obtain IP Address from
IP Address: 0
Subnet Mask: 0
Gateway Address: 0 . 0 . 0 . 0

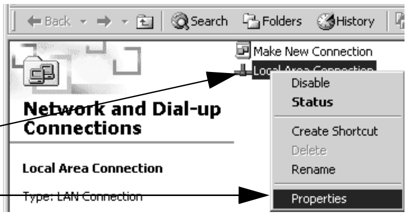
Assign an IP Address to Your Computer

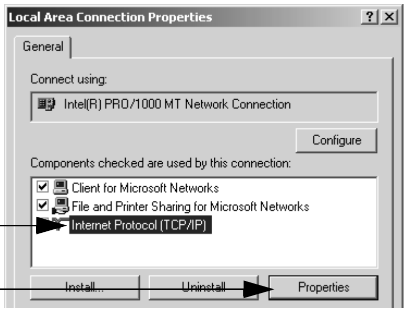
If your EtherNet/IP network is a standalone network and your EtherNet/IP device uses IP address and subnet mask values listed on page 5-3, you may need to change the IP address and subnet mask values for your computer.

1. Access the Network and Dial-up Connections
Start ⇒ Settings ⇒ Network and Dial-up Connections

2. Right-click on Local Area Connection.

3. Click Properties.





Connect using:
Intel(R) PRO/1000 MT Network Connection

Components checked are used by this connection:
☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ Internet Protocol (TCP/IP)

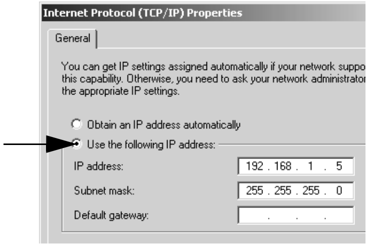
4. Select Internet Protocol (TCP/IP).

5. Click Properties.

6. Select Use the following IP address.

7. Change the IP address and subnet mask.

8. Click OK.



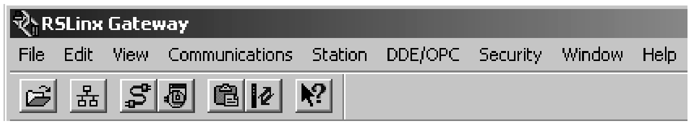
You can get IP settings assigned automatically if your network suppo this capability. Otherwise, you need to ask your network administrator the appropriate IP settings.

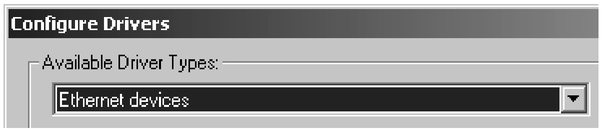
○ Obtain an IP address automatically
● Use the following IP address:
IP address: 192 . 168 . 1 . 5
Subnet mask: 255 . 255 . 255 . 0
Default gateway: . . .

Configure an Ethernet Driver

1. Start RSLinx software.

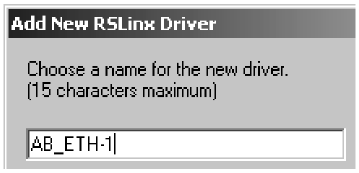
2. Click .


RSLinx Gateway
File Edit View Communications Station DDE/OPC Security Window Help



Available Driver Types: Ethernet devices

3. Select *Ethernet devices* and choose Add New...

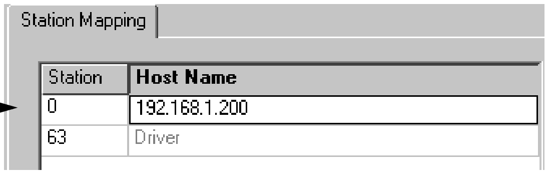


Choose a name for the new driver.
(15 characters maximum)

AB_ETH-1

4. Accept the default name.

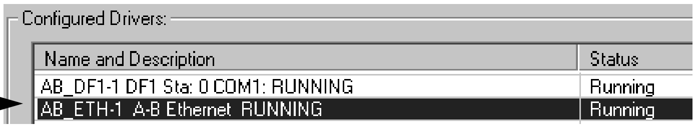
5. Type the IP address of the controller or communication module.



Station	Host Name
0	192.168.1.200
63	Driver

6. Choose OK

Driver is successfully configured and running.



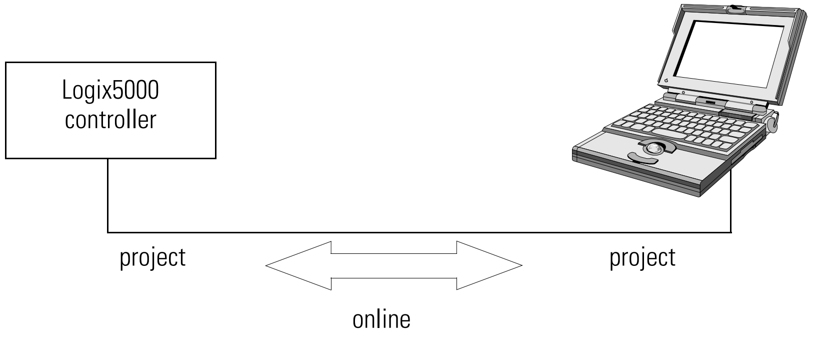
Configured Drivers:

Name and Description	Status
AB_DF1-1 DF1 Sta: 0 COM1: RUNNING	Running
AB_ETH-1 A-B Ethernet RUNNING	Running

Go Online to a Controller

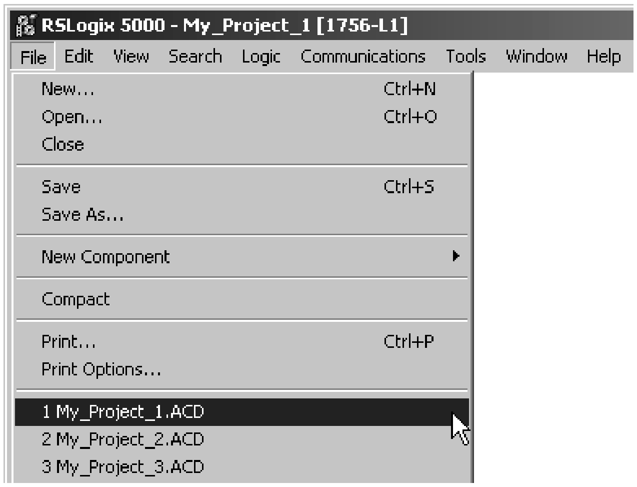
To monitor a project that is executing in a controller, go online with the controller. The procedure that you use depends on whether you have a copy of the project on your computer.

If Your Computer Has the Project For the Controller…

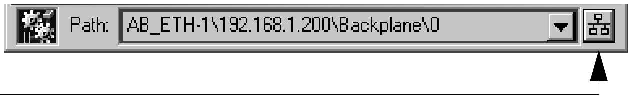


online – monitor a project that a controller is executing.

1. Open the RSLogix 5000 project for the controller.



2. Define the path to the controller:

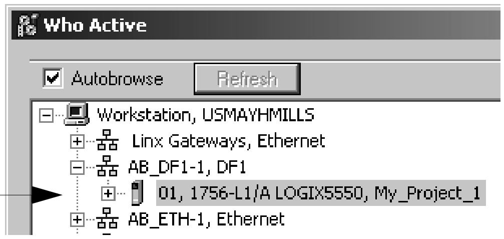

Path: AB_ETH-1\192.168.1.200\Backplane\0

a. Click .

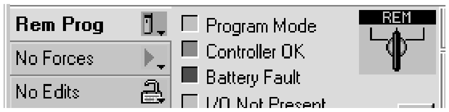
b. Select the controller.

- To open a level, click the + sign.
- If a controller is already selected, make sure that it is the correct controller.

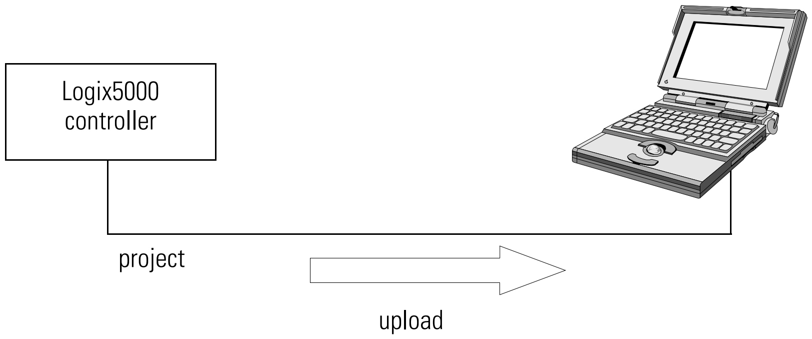
3. Choose Go Online



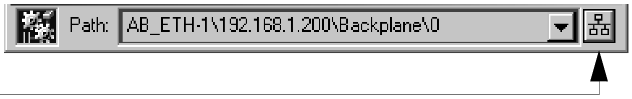
operating mode of the controller



If Your Computer *Does Not* Have the Project For the Controller…



upload – transfer a project from a controller to your computer so you can monitor the project.



Path: AB_ETH-1\192.168.1.200\Backplane\0

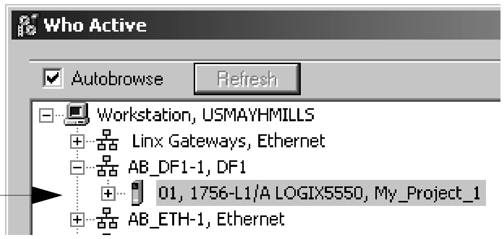
1. Define the path to the controller:

   a. Click 品.

   b. Select the controller.

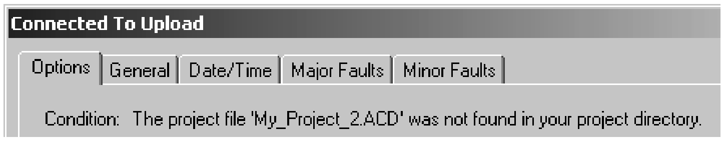
   - To open a level, click the + sign.
   - If a controller is already selected, make sure that it is the correct controller.

2. Choose Upload...

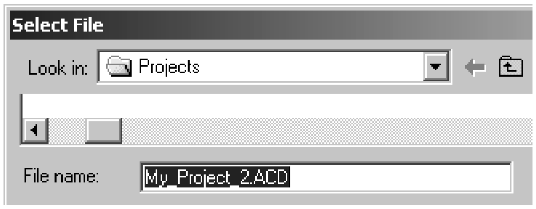


☑ Autobrowse

```
⊟ Workstation, USMAYHMILLS
  ⊞ Linx Gateways, Ethernet
  ⊟ AB_DF1-1, DF1
    ⊞ 01, 1756-L1/A LOGIX5550, My_Project_1
  ⊞ AB_ETH-1, Ethernet
```



Condition: The project file 'My_Project_2.ACD' was not found in your project directory.



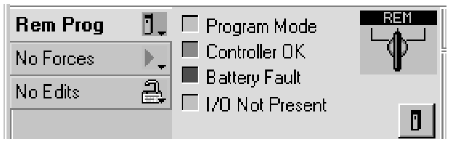
File name: My_Project_2.ACD

3. Create the project file on your computer:

   a. Choose Select File...

   b. Choose Select and then Yes

operating mode of the controller



Rem Prog	□ Program Mode
No Forces	■ Controller OK
No Edits	■ Battery Fault
	□ I/O Not Present

Notes:

Program a Project Online

Using This Chapter

Use this chapter to edit your logic while the controller continues to control your machine or process.

To:	See page:
Edit Logic While Online	6-1
Finalize All Edits in a Program	6-5

Edit Logic While Online

Online edits let you change your logic while your machine or process continues to run.

ATTENTION

Use extreme caution when you edit logic online. Mistakes can injure personnel and damage equipment. Before you edit online:

- Assess how machinery will respond to the changes.
- Notify all personnel of the changes.

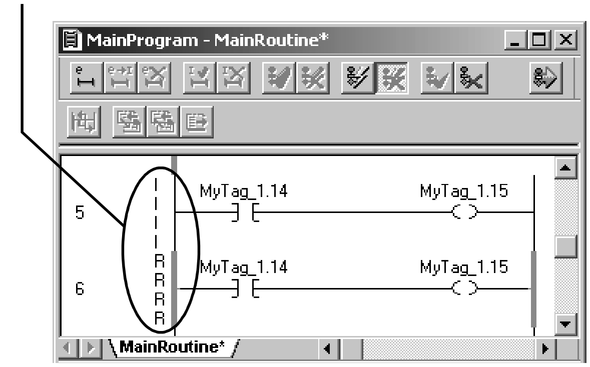
IMPORTANT

When you edit an SFC online:

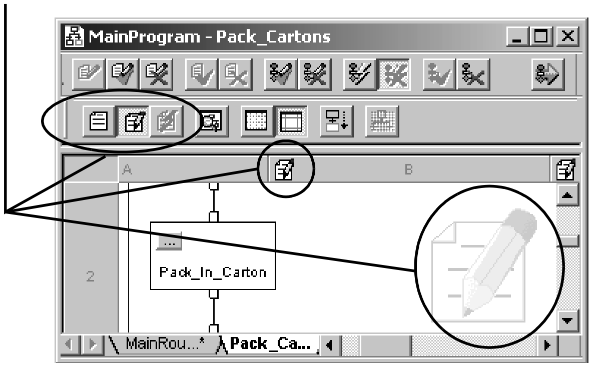
- The SFC resets to the initial step.
- Stored actions turn off.

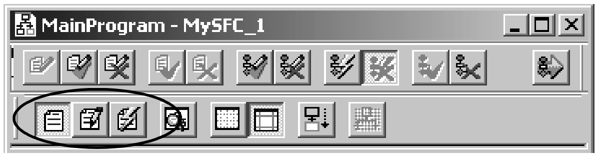
As you perform online edits, RSLogix 5000 software uses markers to show the state of your edits:

relay ladder



function block, structured text, SFC

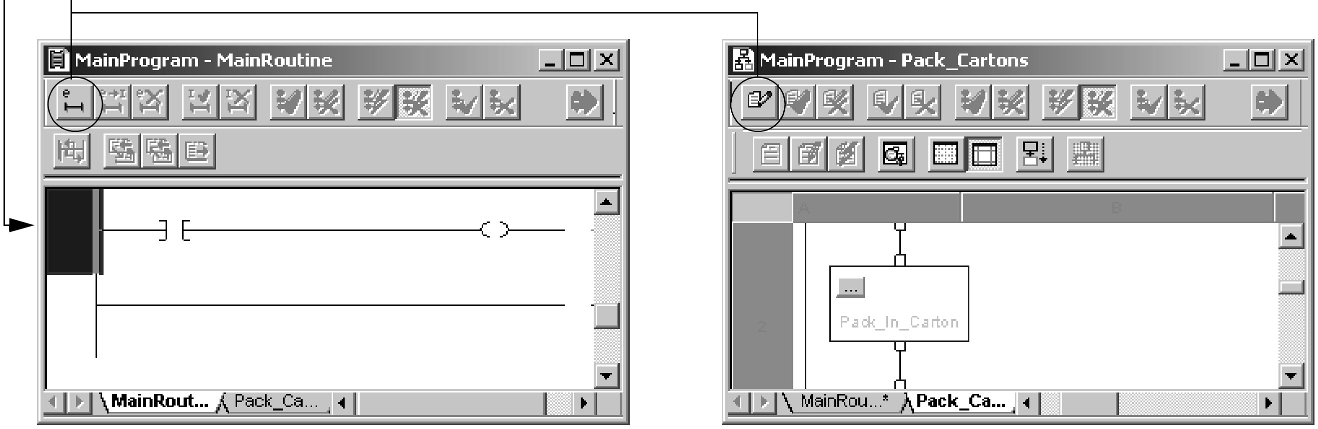


<table>
<tr><th colspan="2">This marker:</th><th>Means:</th><th>Description:</th></tr>
<tr><td>relay ladder</td><td>r
r
- or -
R
R</td><td>original logic</td><td>When online, RSLogix 5000 software continues to show you the original logic while you edit a copy of the logic (pending edit). A green border or side rail shows which logic the controller is currently running.
In function block, structured text, or SFC, use the buttons above the routine to switch between different views.</td></tr>
<tr><td>function block
structured text
SFC</td><td></td><td></td><td> </td></tr>
<tr><td>relay ladder</td><td>i
i
- or -
e
e</td><td>pending edits</td><td>This is a copy of the original logic for you to edit. Any changes remain on your computer until you accept the edits.
• In relay ladder, you edit individual rungs within a routine.
• In function block, structured text, or SFC, you edit an entire routine.</td></tr>
<tr><td>function block
structured text
SFC</td><td></td><td></td><td></td></tr>
<tr><td>relay ladder</td><td>I
I
- or -
D
D</td><td>test edits</td><td>When you accept your pending edits, the software downloads them to the controller and marks them as test edits but the controller continues to execute the original logic. You then manually switch execution to the test edits or back to the original logic (test and untest the edits).
<table>
<tr><th>If you:</th><th>Then:</th></tr>
<tr><td>test the edits</td><td>• Execution switches to the test edits (all test edits execute).
• Outputs in the original logic stay in their last state unless executed by the test edits (or other logic).
• In an SFC, the chart resets to the initial step and stored actions turn off.</td></tr>
<tr><td>untest the edits</td><td>• Execution switches back to the original logic.
• Outputs in the test edits stay in their last state unless executed by the original logic (or other logic).
• In an SFC, the chart resets to the initial step and stored actions turn off.</td></tr>
<tr><td>assemble the edits</td><td>The test edits permanently replace the original logic.</td></tr>
</table>
In relay ladder, if you delete a rung the software immediately marks it as a test edit (upper-case “D” character).</td></tr>
<tr><td>function block
structured text
SFC</td><td></td><td></td><td></td></tr>
</table>

Start a Pending Edit

1. For relay ladder, click (select) the rung that you want to edit.

2. Start a pending edit.

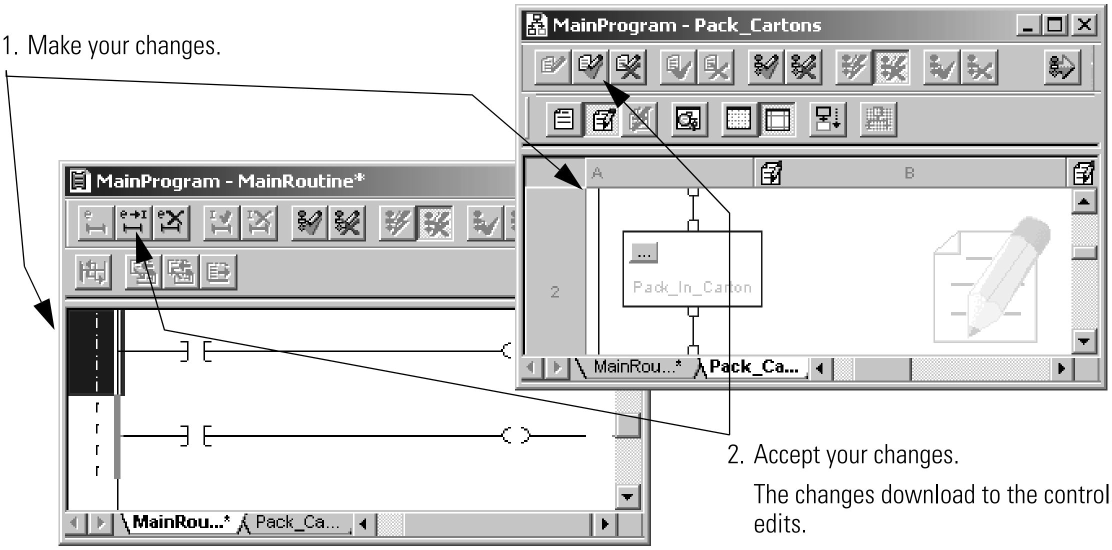


relay ladder

function block, structured text, SFC

Make and Accept Your Edits

1. Make your changes.



function block, structured text, SFC

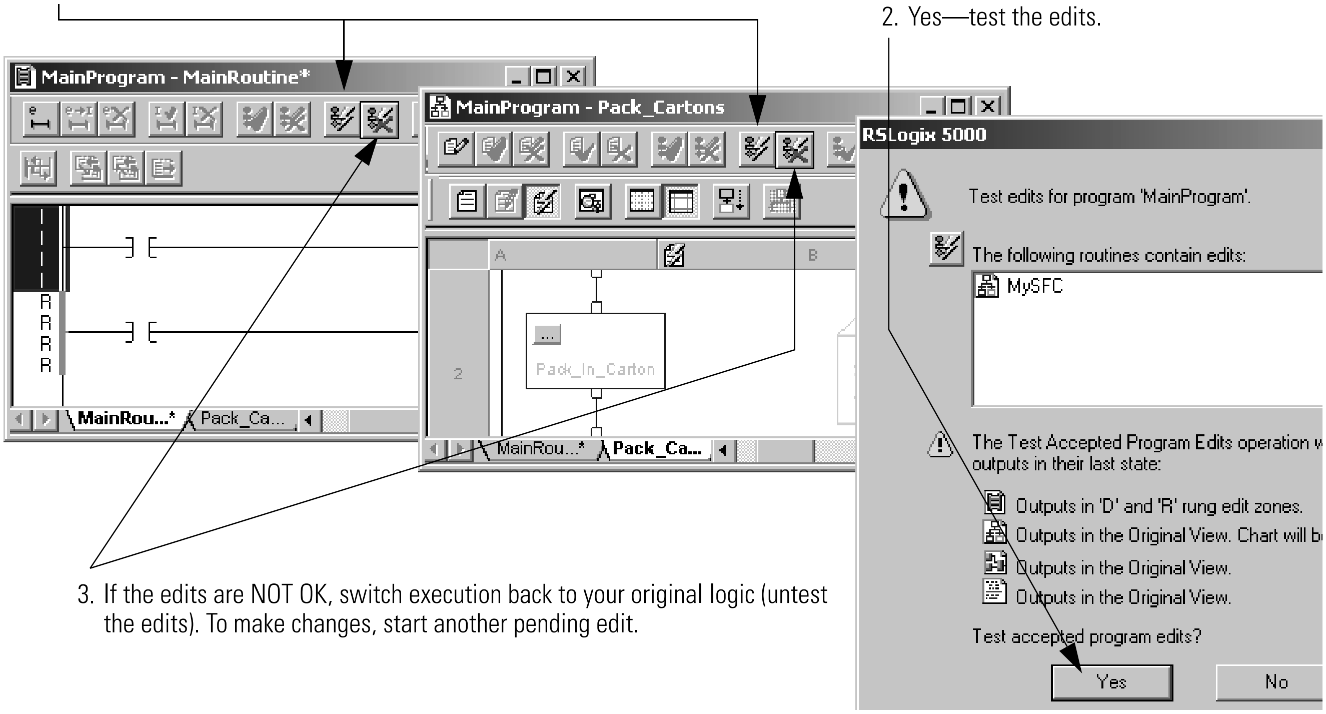
2. Accept your changes.

   The changes download to the controller and become test edits.

relay ladder

Test the Edits

1. Test the edits to see if they execute as intended.



2. Yes—test the edits.

RSLogix 5000

Test edits for program 'MainProgram'.

The following routines contain edits:

MySFC

The Test Accepted Program Edits operation w
outputs in their last state:

Outputs in 'D' and 'R' rung edit zones.

Outputs in the Original View. Chart will b

Outputs in the Original View.

Outputs in the Original View.

Test accepted program edits?

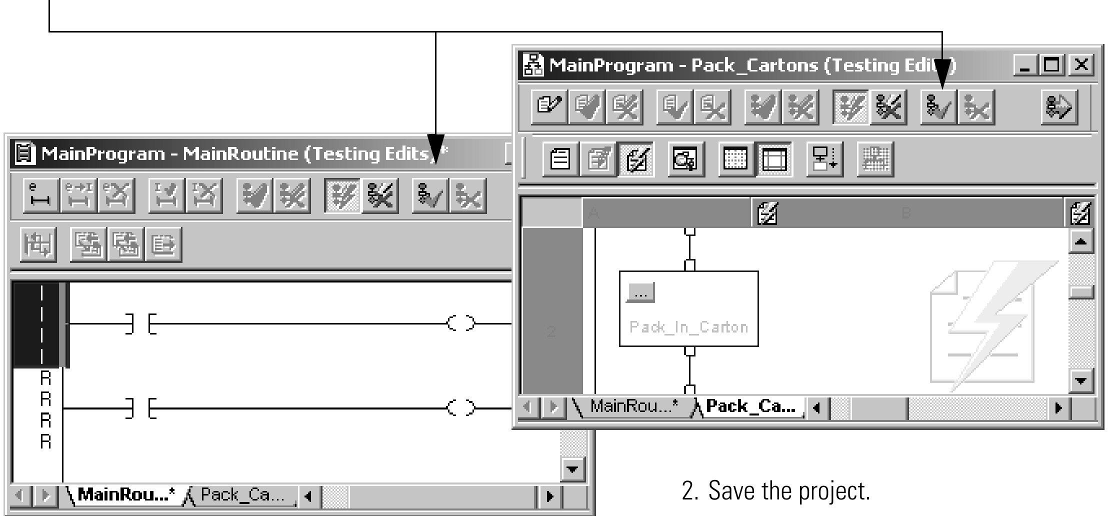
Yes No

3. If the edits are NOT OK, switch execution back to your original logic (untest the edits). To make changes, start another pending edit.

Assemble and Save the Edits

1. Assemble the edits.

The edits become permanent and the original logic is removed.



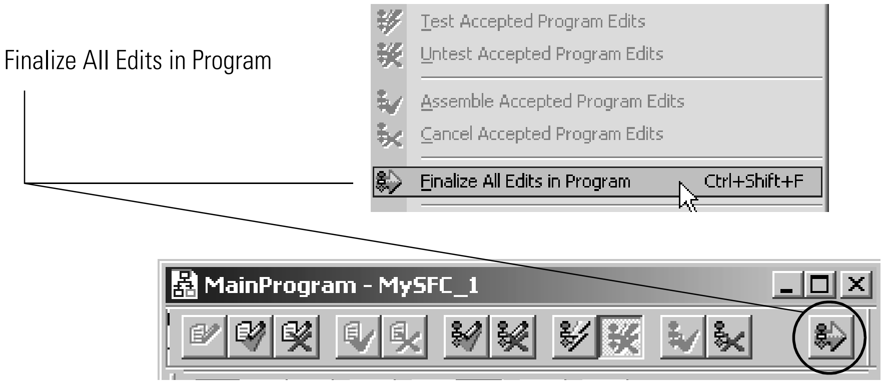
MainProgram - Pack_Cartons (Testing Edits)
A
B
2
Pack_In_Carton
MainRou...*
Pack_Ca...
MainProgram - MainRoutine (Testing Edits)*
MainRou...*
Pack_Ca...

2. Save the project.

Finalize All Edits in a Program

RSLogix 5000 software 13.0 or later

The *Finalize All Edits in Program* option lets you make an online change to your logic *without* testing the change.


Finalize All Edits in Program

Test Accepted Program Edits
Untest Accepted Program Edits
Assemble Accepted Program Edits
Cancel Accepted Program Edits
Finalize All Edits in Program Ctrl+Shift+F
MainProgram - MySFC_1

ATTENTION

Use extreme caution when you edit logic online. Mistakes can injure personnel and damage equipment. Before you edit online:

- Assess how machinery will respond to the changes.
- Notify all personnel of the changes.

When you choose *Finalize All Edits in Program:*

- *All* edits in the program (pending and test), immediately download to the controller and begin execution.
- The original logic is permanently removed from the controller.
- Outputs that were in the original logic stay in their last state unless executed by the new logic (or other logic).
- If your edits include an SFC:
  - The SFC resets to the initial step.
  - Stored actions turn off.

To use the *Finalize All Edits in Program* option:

1. Start a pending edit.
2. Make your change.
3. Choose *Finalize All Edits in Program.*

Notes:

Troubleshoot the Controller

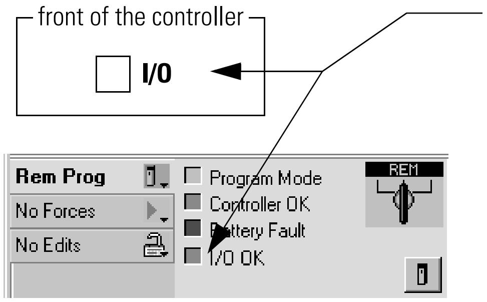
Using This Chapter

Use this chapter to obtain basic diagnostic information about your system and perform basic troubleshooting tasks.

If:	Then:	See page:
there is a problem with several of the devices in your system, communication with an I/O module may have failed.	Troubleshoot I/O Communication	7-2
your entire process unexpectedly shut down, the controller may have experienced a major fault.	Clear a Major Fault	7-4
you want to find a specific element (tag, instruction, etc.) within a project	Search a Project	7-5
you want to browse the project for a specific element (tag, instruction, etc.)	Browse Logic	7-7
you want to: • override input data • override logic • check wiring to an output device	Force an I/O Value	7-8
you want to sample the data of one or more tags over at a specific period.	Create and Run a Trend (Histogram)	7-11
you want to see the scan time of a task or program.	View Scan Time	7-13

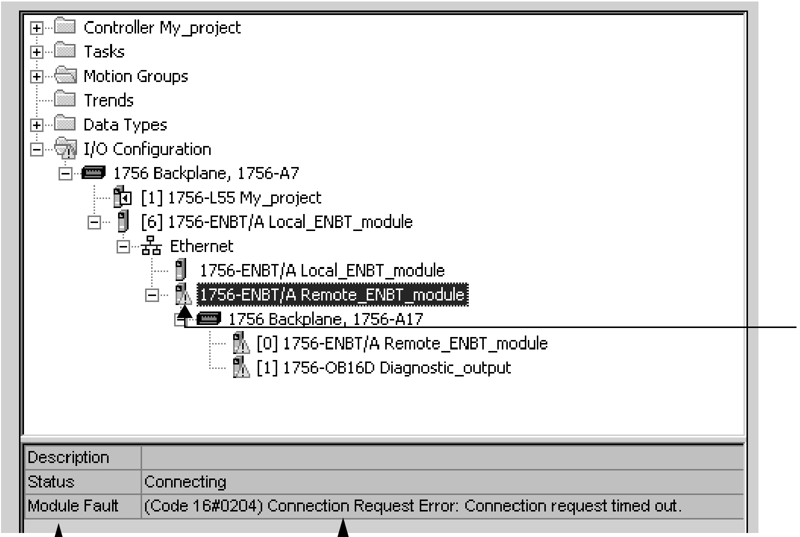
Troubleshoot I/O Communication

If there is a problem with several of the devices in your system, communication with an I/O module may have failed.



Status of I/O communication

If:	Then:
off	Either: • There are *no* modules in the I/O configuration of the controller. • The controller does *not* contain a project (controller memory is empty).
solid green	The controller is communicating with all the modules in its I/O configuration.
flashing green	One or more modules in the I/O configuration of the controller are *not* responding.



```
Controller My_project
Tasks
Motion Groups
Trends
Data Types
I/O Configuration
  1756 Backplane, 1756-A7
    [1] 1756-L55 My_project
    [6] 1756-ENBT/A Local_ENBT_module
      Ethernet
        1756-ENBT/A Local_ENBT_module
        1756-ENBT/A Remote_ENBT_module
          1756 Backplane, 1756-A17
            [0] 1756-ENBT/A Remote_ENBT_module
            [1] 1756-OB16D Diagnostic_output
```

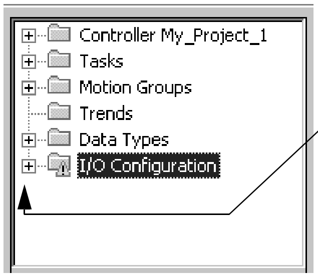
Description	
Status	Connecting
Module Fault	(Code 16#0204) Connection Request Error: Connection request timed out.

A ⚠ over a module means that the controller is *not* communicating with the module.

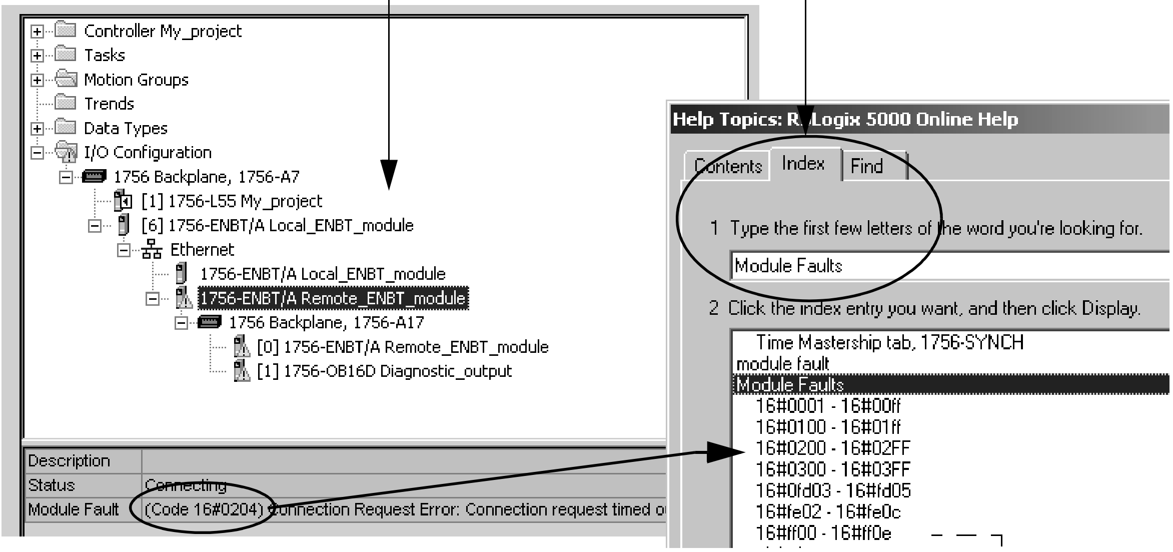
connection – communication link between 2 devices, such as between a controller and I/O module, PanelView terminal, or another controller. Logix5000 controllers use connections to communicate with the modules in its I/O configuration.

module fault – communication with a module has failed.

TIP Troubleshoot communication modules first. A faulted communication module effects the modules that are under it.

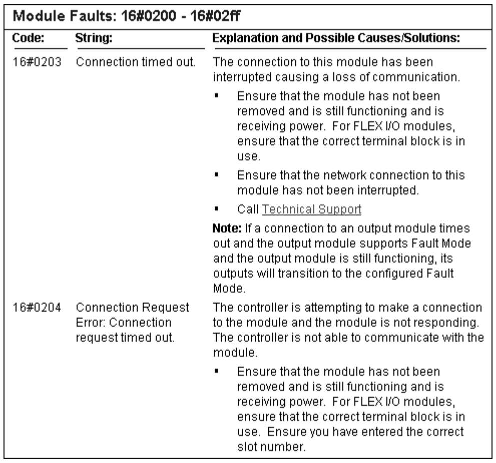


1. Go online with the controller.
2. If necessary, click the + signs of the I/O Configuration tree to show the faulted modules
3. Select the faulted module.
4. Choose *Help* ⇒ *Contents.*
5. Click the *Index* tab and type `module faults`.


Controller My_project
Tasks
Motion Groups
Trends
Data Types
I/O Configuration
1756 Backplane, 1756-A7
[1] 1756-L55 My_project
[6] 1756-ENBT/A Local_ENBT_module
Ethernet
1756-ENBT/A Local_ENBT_module
1756-ENBT/A Remote_ENBT_module
1756 Backplane, 1756-A17
[0] 1756-ENBT/A Remote_ENBT_module
[1] 1756-OB16D Diagnostic_output
Help Topics: RSLogix 5000 Online Help
Contents
Index
Find
1 Type the first few letters of the word you're looking for.
Module Faults
2 Click the index entry you want, and then click Display.
Time Mastership tab, 1756-SYNCH
module fault
Module Faults
16#0001 - 16#00ff
16#0100 - 16#01ff
16#0200 - 16#02FF
16#0300 - 16#03FF
16#0fd03 - 16#fd05
16#fe02 - 16#fe0c
16#ff00 - 16#ff0e

Description	
Status	Connecting
Module Fault	(Code 16#0204) Connection Request Error: Connection request timed o

6. Select the corresponding module fault information and choose Display

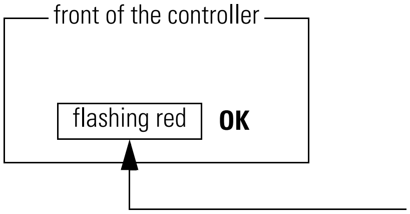


Module Faults: 16#0200 - 16#02ff

Code:	String:	Explanation and Possible Causes/Solutions:
16#0203	Connection timed out.	The connection to this module has been interrupted causing a loss of communication. • Ensure that the module has not been removed and is still functioning and is receiving power. For FLEX I/O modules, ensure that the correct terminal block is in use. • Ensure that the network connection to this module has not been interrupted. • Call Technical Support **Note:** If a connection to an output module times out and the output module supports Fault Mode and the output module is still functioning, its outputs will transition to the configured Fault Mode.
16#0204	Connection Request Error: Connection request timed out.	The controller is attempting to make a connection to the module and the module is not responding. The controller is not able to communicate with the module. • Ensure that the module has not been removed and is still functioning and is receiving power. For FLEX I/O modules, ensure that the correct terminal block is in use. Ensure you have entered the correct slot number.

Clear a Major Fault

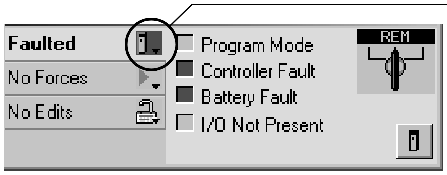
If your entire process unexpectedly shut down, the controller *may* have experienced a major fault.

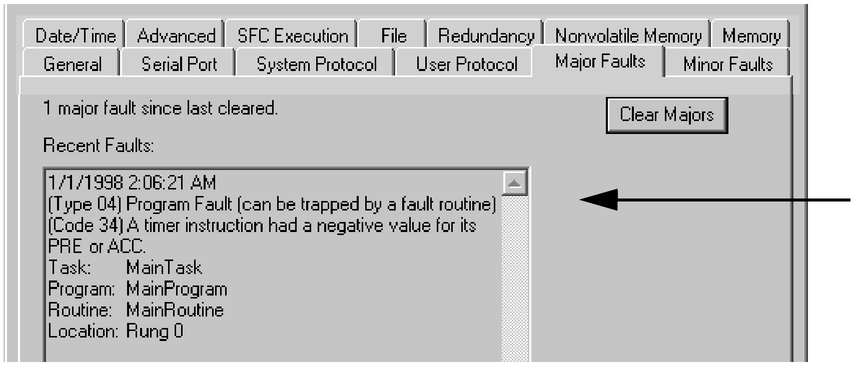


major fault – the controller detected a fault condition that is severe enough for it to shut down.

1. Go online with the controller.

2. Choose *Go To Faults*.





1 major fault since last cleared.

Recent Faults:

```
1/1/1998 2:06:21 AM
(Type 04) Program Fault (can be trapped by a fault routine)
(Code 34) A timer instruction had a negative value for its
PRE or ACC.
Task:      MainTask
Program:  MainProgram
Routine:  MainRoutine
Location: Rung 0
```

3. Use this information to correct the cause of the fault.

   For more information about a fault code, see *Logix5000 Controllers System Reference*, publication 1756-QR107.

4. After you correct the cause of the fault, choose Clear Majors

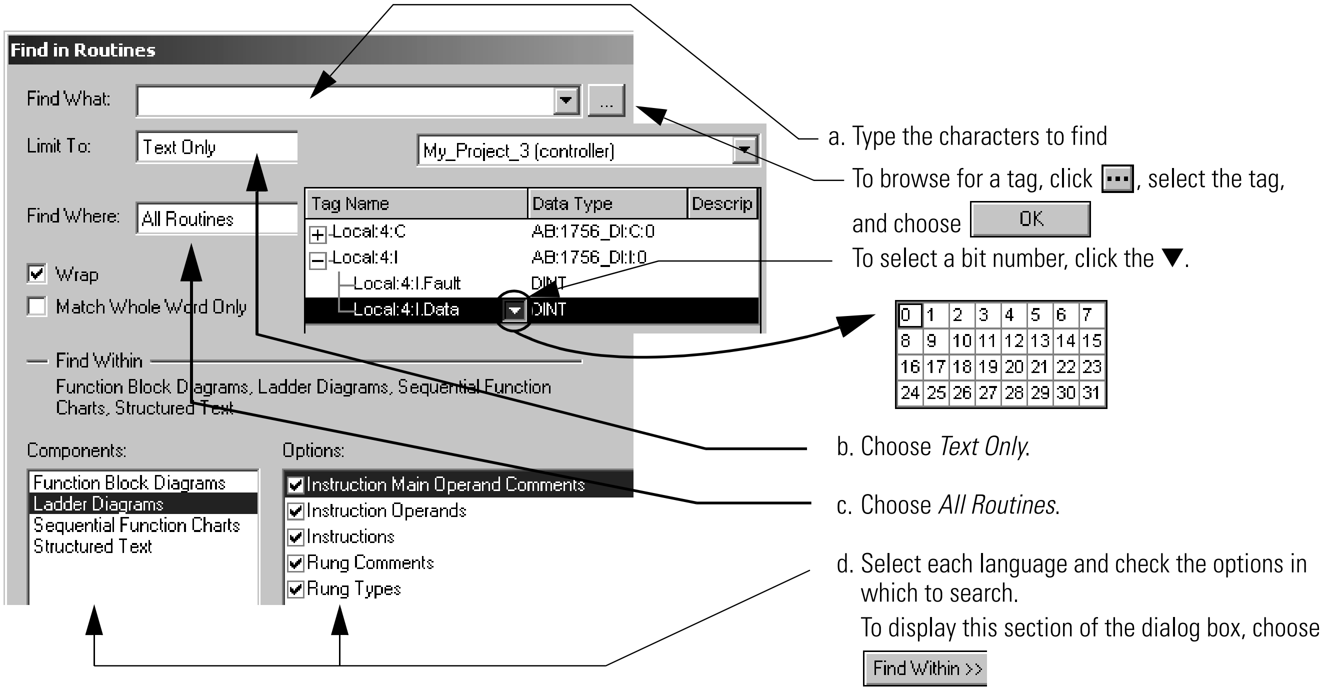
Search a Project

You can find an element of your logic (tag, instruction, comment, etc.) based on the characters that you search for:

To find a:	Specify:	Example:
tag	full or partial tag name	`MyTag_1`
comment/description	text within the comment/description	`fan`
instruction	mnemonic of the instruction	`OTE`
instruction and tag	mnemonic and tag	`OTE MyTag_1`

Search for All Occurrences of a Tag, Instruction, etc.

1. Open the RSLogix 5000 project that you want to search
2. Choose *Search* ⇒ *Find*.
3. Specify the search criteria:



Find in Routines

Find What:

Limit To: Text Only

Find Where: All Routines

☑ Wrap

□ Match Whole Word Only

Find Within
Function Block Diagrams, Ladder Diagrams, Sequential Function Charts, Structured Text

My_Project_3 (controller)

Tag Name	Data Type	Descrip
Local:4:C	AB:1756_DI:C:0	
Local:4:I	AB:1756_DI:I:0	
Local:4:I.Fault	DINT	
Local:4:I.Data	DINT	

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31

Components:
Function Block Diagrams
Ladder Diagrams
Sequential Function Charts
Structured Text

Options:
☑ Instruction Main Operand Comments
☑ Instruction Operands
☑ Instructions
☑ Rung Comments
☑ Rung Types

a. Type the characters to find

To browse for a tag, click ..., select the tag, and choose OK

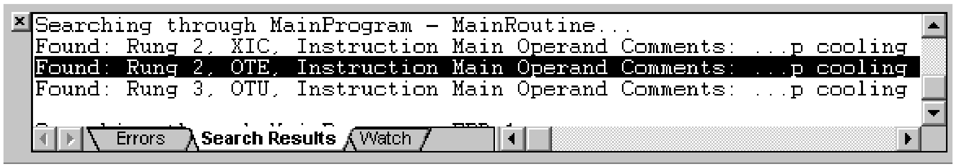
To select a bit number, click the ▼.

b. Choose *Text Only*.

c. Choose *All Routines*.

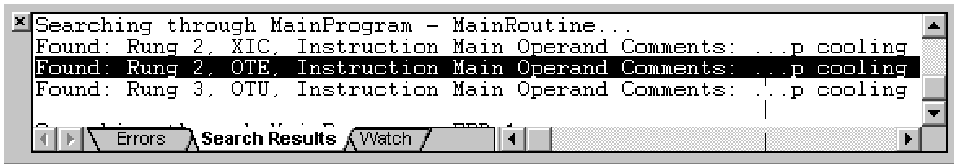
d. Select each language and check the options in which to search.
To display this section of the dialog box, choose Find Within >>

4. Choose Find All



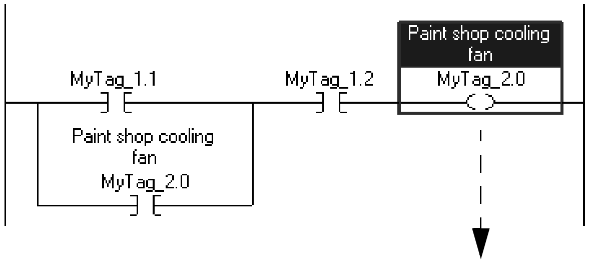
```
Searching through MainProgram - MainRoutine...
Found: Rung 2, XIC, Instruction Main Operand Comments: ...p cooling
Found: Rung 2, OTE, Instruction Main Operand Comments: ...p cooling
Found: Rung 3, OTU, Instruction Main Operand Comments: ...p cooling
```

Go to an Instruction

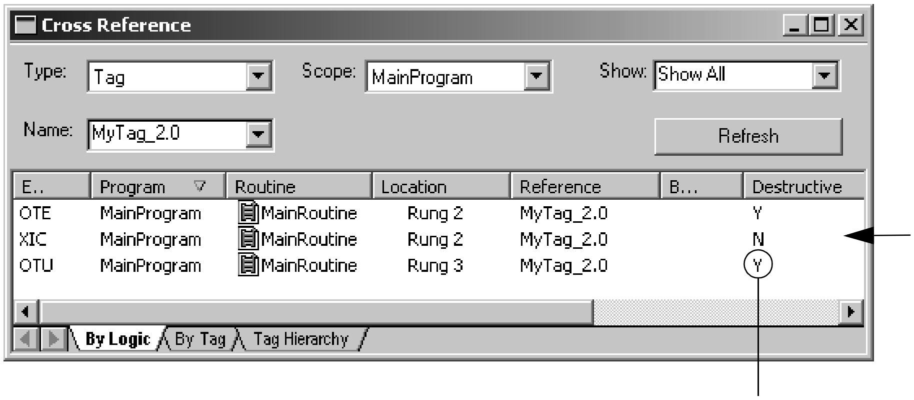


```
Searching through MainProgram - MainRoutine...
Found: Rung 2, XIC, Instruction Main Operand Comments: ...p cooling
Found: Rung 2, OTE, Instruction Main Operand Comments: ...p cooling
Found: Rung 3, OTU, Instruction Main Operand Comments: ...p cooling
```

1. To go to an instruction, double-click it.



2. To show a list of cross-references to a tag, right-click and choose *Go To Cross Reference…*



Cross Reference

Type: Tag   Scope: MainProgram   Show: Show All

Name: MyTag_2.0

E..	Program	Routine	Location	Reference	B…	Destructive
OTE	MainProgram	MainRoutine	Rung 2	MyTag_2.0		Y
XIC	MainProgram	MainRoutine	Rung 2	MyTag_2.0		N
OTU	MainProgram	MainRoutine	Rung 3	MyTag_2.0		Y

3. To go to an instruction, double-click it.

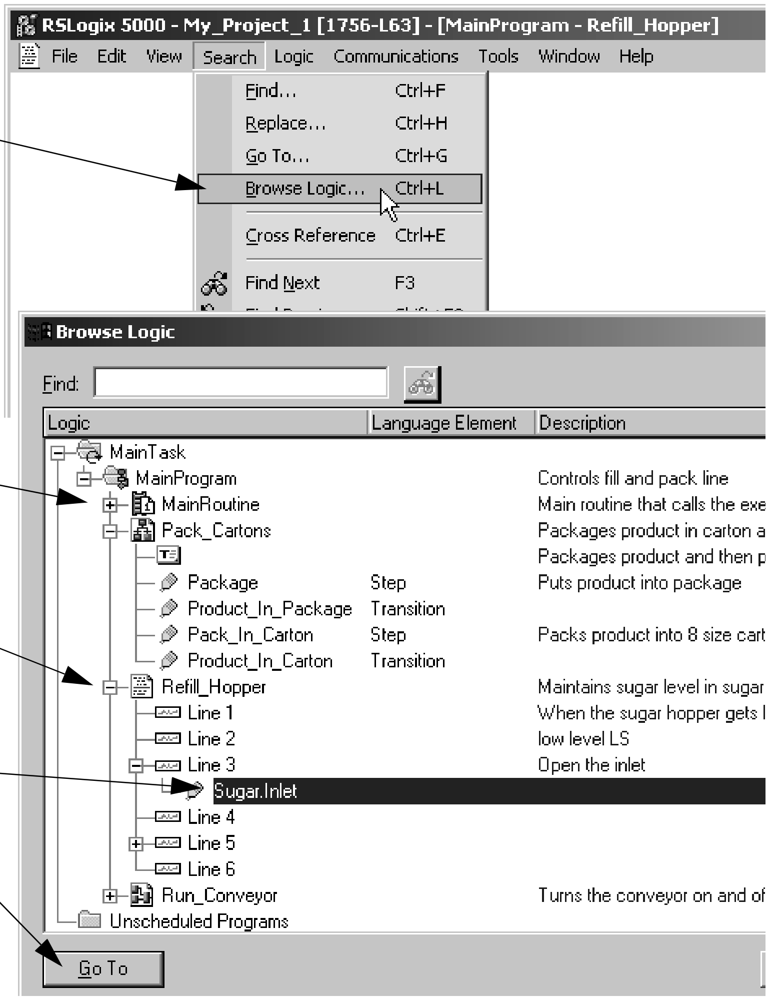
A “Y” means this instruction changes the value of the tag.

Browse Logic

RSLogix 5000 software
13.0 or later

To browse the logic of a routine for a specific item (instruction, element, tag, comment, etc.), use the Browse Logic window.

1. In RSLogix 5000 software, choose *Search ⇒ Browse Logic*.
2. To expand an entry and see its contents, either:
   - Double-click the entry.
   - Click the + sign.
   - Right-click the entry and choose *Expand All*.
3. To collapse an entry and hide its contents, either:
   - Double-click the entry.
   - Click the - sign.
4. To go to the location of a element in logic, select the element and choose *Go To*.

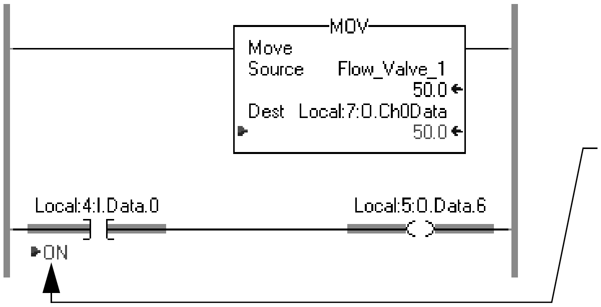

RSLogix 5000 - My_Project_1 [1756-L63] - [MainProgram - Refill_Hopper]
File Edit View Search Logic Communications Tools Window Help
Find... Ctrl+F
Replace... Ctrl+H
Go To... Ctrl+G
Browse Logic... Ctrl+L
Cross Reference Ctrl+E
Find Next F3
Browse Logic
Find:
Go To

Logic	Language Element	Description
MainTask		
MainProgram		Controls fill and pack line
MainRoutine		Main routine that calls the exe
Pack_Cartons		Packages product in carton a
		Packages product and then p
Package	Step	Puts product into package
Product_In_Package	Transition	
Pack_In_Carton	Step	Packs product into 8 size cart
Product_In_Carton	Transition	
Refill_Hopper		Maintains sugar level in sugar
Line 1		When the sugar hopper gets l
Line 2		low level LS
Line 3		Open the inlet
Sugar.Inlet		
Line 4		
Line 5		
Line 6		
Run_Conveyor		Turns the conveyor on and of
Unscheduled Programs		

Force an I/O Value

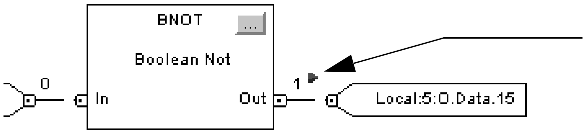
Use a force to override input data or logic when you need to:

- test and debug your logic
- check wiring to an output device
- temporarily keep your process functioning when an input device has failed

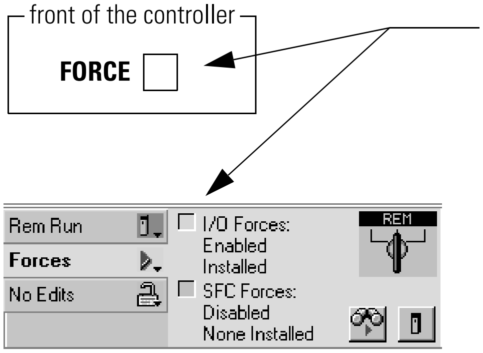


force – override a value from an input device or logic

- Forcing an input tag overrides the value from the input device.
- Forcing an output tag overrides your logic and sends the force value to the output device.



When forces are in effect (enabled), a ▶ appears next to the forced element.



Status of I/O forces

If:	Then:
off	• No tags contain I/O force values. • I/O forces are inactive (disabled).
flashing amber	• One or more tags contain a force value. • I/O forces are inactive (disabled). • When you enable I/O forces, *all* existing I/O forces take effect.
solid amber	• I/O forces are active (enabled). • Force values may or may not exist. • When you install (add) a force, it immediately takes effect.

If you want to:	Then:
override a value	Install an I/O Force (Force an I/O Value)
stop an individual force but leave other forces enabled and in effect	Remove an Individual Force
stop all I/O forces but leave the I/O forces in the project	Disable All I/O Forces

ATTENTION

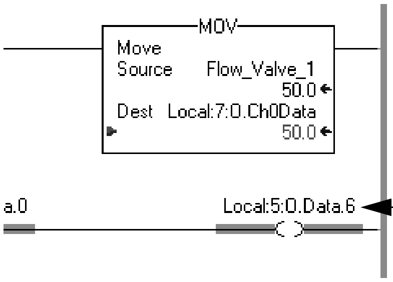
⚠

Forcing can cause unexpected machine motion that could injure personnel. Before you install, disable, or remove a force, determine how the change will effect your machine or process and keep personnel away from the machine area.

- Enabling I/O forces causes input, output, produced, or consumed values to change.
- If you remove an individual force, forces remain in the enabled state.
- If forces are enabled and you install a force, the new force immediately takes effect.

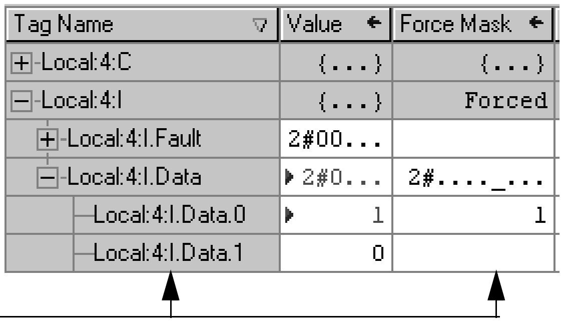
Install an I/O Force (Force an I/O Value)

1. Go online with the controller and open the routine that contains the tag that you want to force.



2. Right-click the tag and choose *Monitor…*

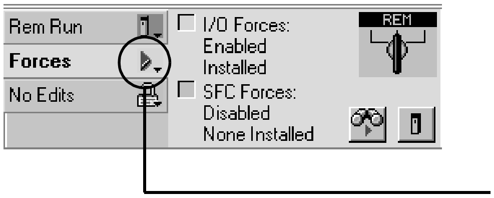
3. If necessary, click the + sign of the tag to show the value that you want to force (e.g., BOOL value of a DINT tag).



Tag Name	Value	Force Mask
⊞-Local:4:C	{...}	{...}
⊟-Local:4:I	{...}	Forced
⊞-Local:4:I.Fault	2#00...	
⊟-Local:4:I.Data	2#0...	2#...._...
Local:4:I.Data.0	1	1
Local:4:I.Data.1	0	

4. Install the force value:

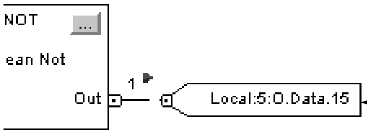
To force a:	Do this:
BOOL value	Right-click the tag and choose *Force ON* or *Force OFF.*
integer or REAL value	In the *Force Mask* column for the tag, type the value to which you want to force the tag and press [Enter}.



5. Choose *I/O Forcing* ⇒ *Enable All I/O Forces*. and choose Yes (yes—enable I/O forces).

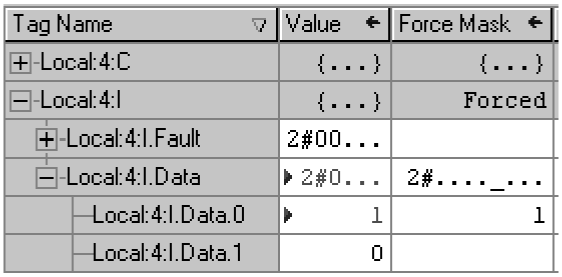
Remove an Individual Force

1. Go online with the controller and open the routine that contains the tag that you want to force.



2. Right-click the tag and choose *Monitor…*

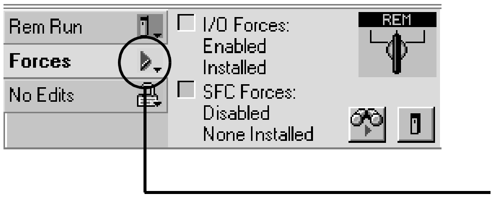
3. If necessary, click the + sign of the tag to show its members (e.g., BOOL value of a DINT tag).



Tag Name	Value	Force Mask
⊞-Local:4:C	{...}	{...}
⊟-Local:4:I	{...}	Forced
⊞-Local:4:I.Fault	2#00...	
⊟-Local:4:I.Data	▸2#0...	2#...._...
Local:4:I.Data.0	▸ 1	1
Local:4:I.Data.1	0	

4. Right-click the tag and choose *Remove Force*.

Disable All I/O Forces



Rem Run

Forces

No Edits

□ I/O Forces:
Enabled
Installed

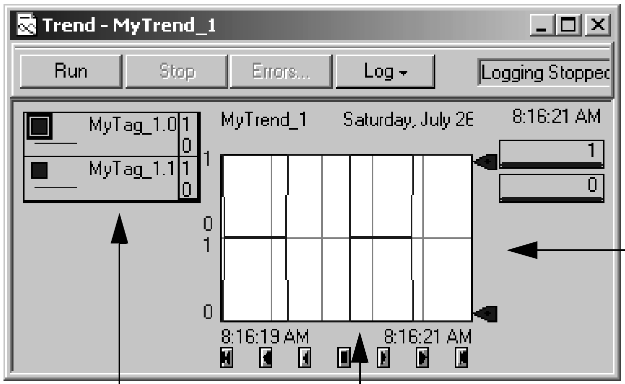
□ SFC Forces:
Disabled
None Installed

1. Go online with the controller.

2. Choose *I/O Forcing* ⇒ *Disable All I/O Forces*. and choose Yes (yes—disable I/O forces).

Create and Run a Trend (Histogram)

Trends let you view sampled tag data over a period of time on a graphical display. Tag data is sampled by the controller and then displayed as point(s) on a trend chart.



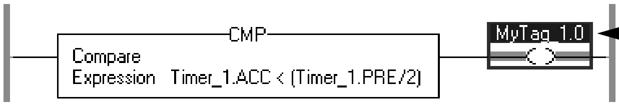
trend – sample specific tags over time and show the data on a graphical display.

values of the tags

tags that you want to look at

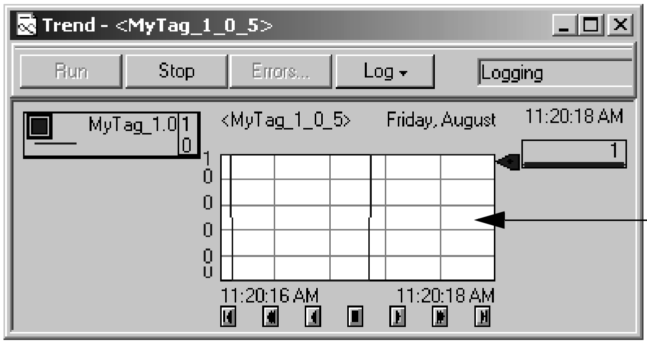
time

Run a Trend for a Tag

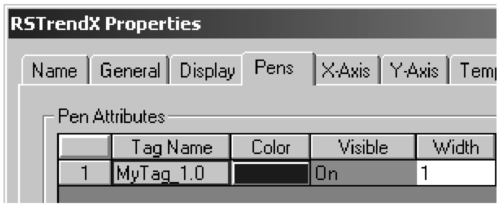


Right-click the first tag that you want to trend and choose *Trend…*

Add More Tags to the Trend

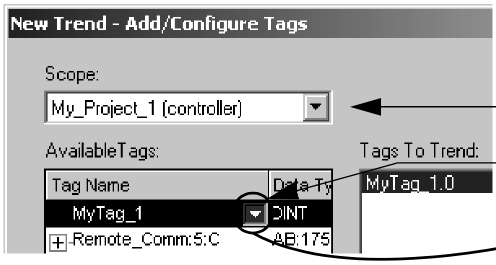


1. Right-click the chart and choose *Chart Properties*.
2. Click the *Pens* tab.



	Tag Name	Color	Visible	Width
1	MyTag_1.0	■	On	1

3. Choose Add/Configure Tags
4. Select a tag to add and choose Add -->



To change the scope, select a scope.

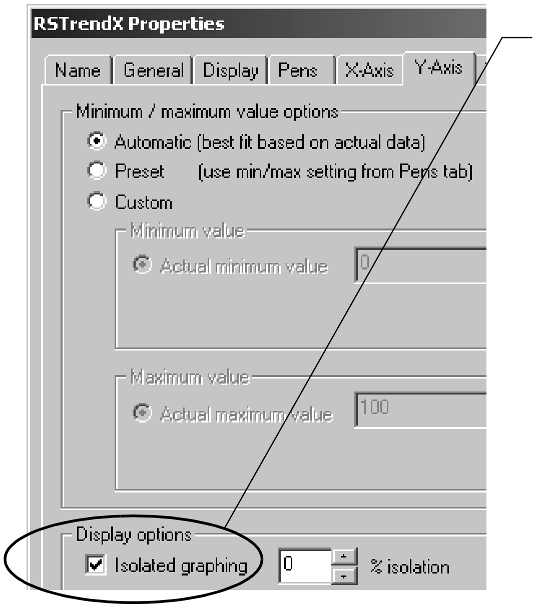
To select a bit number, click the ▼.

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31

5. When you have added the required tags, choose OK

Add More Tags to the Trend (continued)

6. Click the *Y-Axis* tab.



RSTrendX Properties

Minimum / maximum value options

● Automatic (best fit based on actual data)

○ Preset (use min/max setting from Pens tab)

○ Custom

Minimum value

● Actual minimum value 0

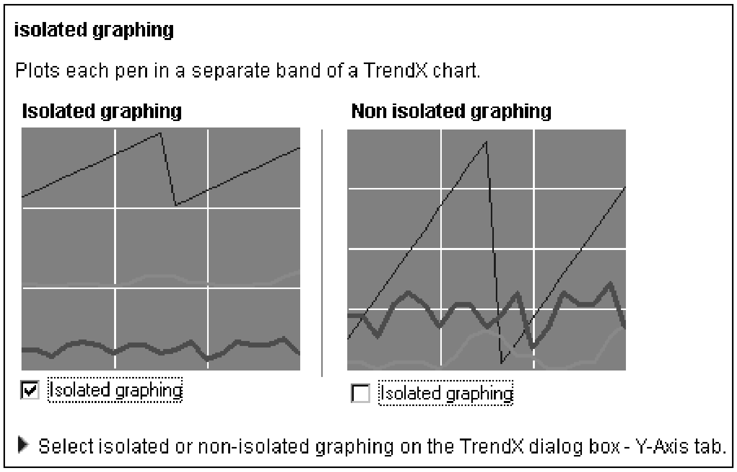
Maximum value

● Actual maximum value 100

Display options

☑ Isolated graphing 0 % isolation

7. Choose the type of graphing.



isolated graphing

Plots each pen in a separate band of a TrendX chart.

☑ Isolated graphing

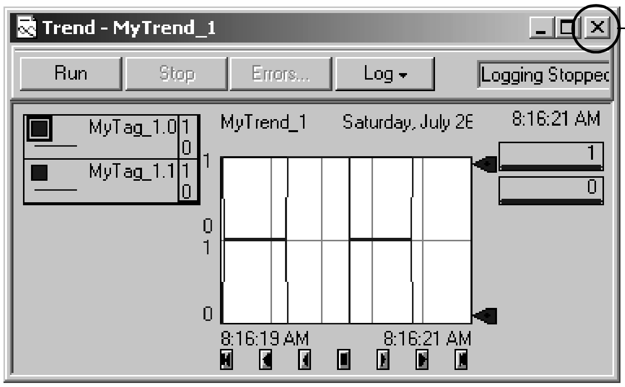
□ Isolated graphing

▶ Select isolated or non-isolated graphing on the TrendX dialog box - Y-Axis tab.

8. Choose OK

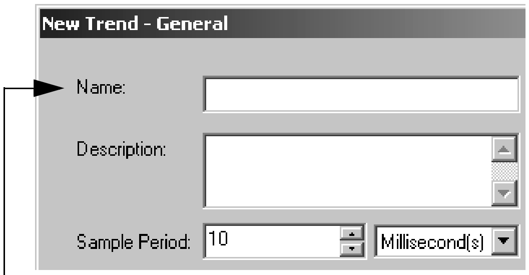
9. To resume the trend, choose Run

Optional—Save the Trend



Trend - MyTrend_1

1. When you close the trend, you have the option save the trend for future use.



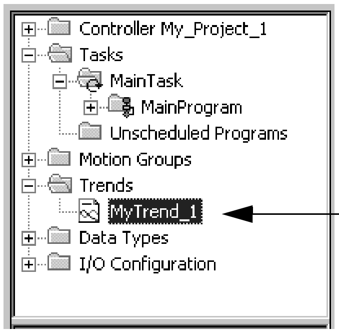
New Trend - General

Name:

Description:

Sample Period: 10 Millisecond(s)

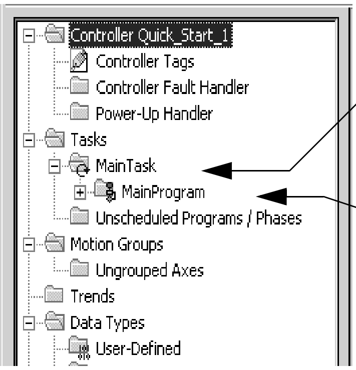
2. Type a name for the trend and choose Finish



trend

View Scan Time

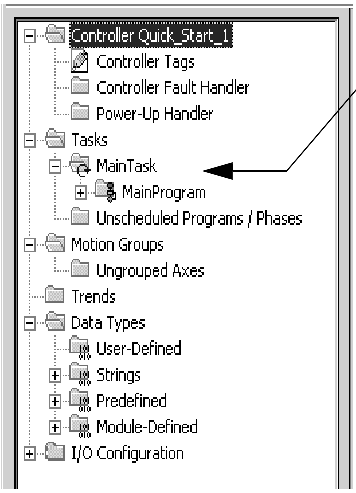
A Logix5000 controller provides two types of scan times. Each serves a different purpose:



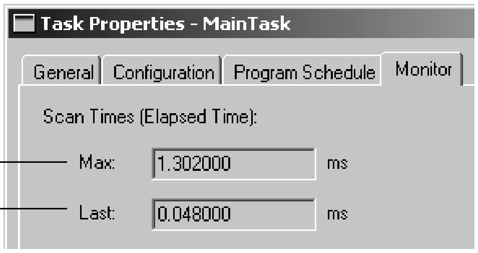
elapsed time (task scan time) – time that has elapsed from the start of a task to the end of the task, in milliseconds. The elapsed time of a task includes the time that the task is interrupted to service communications or other tasks.

execution time (program scan time) –time to execute the logic of a program (its main routine and any subroutines that the main routine calls), in microseconds.The scan time of a program includes only the execution time of the logic. It *does not* include any interrupts.

View Task Scan Time



1. Right-click and choose *Properties*.
2. Click the *Monitor* tab.



Scan Times (Elapsed Time):

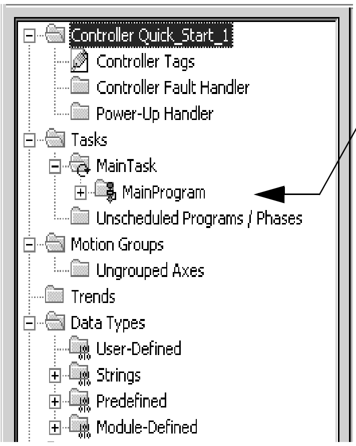
Max: 1.302000 ms

Last: 0.048000 ms

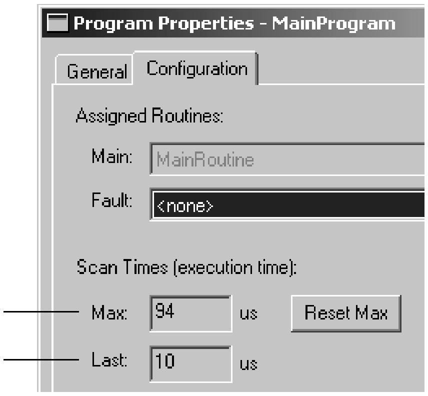
elapsed time of the last execution of this task

maximum elapsed time of the task

View Program Scan Time



1. Right-click and choose *Properties*.
2. Click the *Configuration* tab.



Assigned Routines:

Main: MainRoutine

Fault: <none>

Scan Times (execution time):

Max: 94 us

Last: 10 us

maximum execution time of this program

execution time of the last execution of this program

Notes:

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Logix5000 Controllers

Quick Start