Programming Manual

Allen-Bradley

Logix5000 Controllers Information and Status

Catalog Numbers 1756 ControlLogix, 1756 GuardLogix, 1768 Compact GuardLogix, 1768 CompactLogix, 1769 CompactLogix, 1789 SoftLogix, PowerFlex with DriveLogix

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.rockwellautomation.com/literature/) 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.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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.
	**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 consequence
	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

This manual contains new and updated information.

IMPORTANT RSLogix 5000 programming software is now known as Studio 5000™ Logix Designer application, a component of Studio 5000 Engineering and Design Environment.

The following controllers are no longer supported in the Logix Designer application, version 21.

Catalog Number	Description
1756-L61	ControlLogix 5561 Controller
1756-L61S	ControlLogix 5561S Controller
1756-L62	ControlLogix 5562 Controller
1756-L62S	ControlLogix 5562S Controller
1756-L63	ControlLogix 5563 Controller
1756-L63S	ControlLogix 5563S Controller
1756-L64	ControlLogix 5564 Controller
1756-L65	ControlLogix 5565 Controller
1768-L43	CompactLogix 5343 Controller
1768-L43S	CompactLogix 5343S Controller
1768-L45	CompactLogix 5345 Controller
1768-L45S	CompactLogix 5345S Controller
1769-L23E-QBF1	CompactLogix 5323E-QB1 Controller
1769-L23E-QBFC1	CompactLogix 5323E-QBFC1 Controller
1769-L23-QBFC1	CompactLogix 5323-QBFC1 Controller
1769-L31	CompactLogix 5331 Controller
1769-L32C	CompactLogix 5332C Controller
1769-L32E	CompactLogix 5332E Controller
1769-L35CR	CompactLogix 5335CR Controller
1769-L35E	CompactLogix 5335E Controller

Changes throughout this revision are marked by change bars, as shown in the margin of this page.

There are a number of minor changes throughout this publication that were made to clarify existing information. The major changes are listed below.

Change	Page
Updated Controller Log Events table to add new entry and correct existing entries.	page 43

Notes:

Chapter 4

Change Detection

Chapter 5

Access Status Information

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Studio 5000 Engineering and Design Environment and Logix Designer Application

The Studio 5000™ Engineering and Design Environment combines engineering and design elements into a common environment. The first element in the Studio 5000 environment is the Logix Designer application. The Logix Designer application is the rebranding of RSLogix™ 5000 software and will continue to be the product to program Logix5000™ controllers for discrete, process, batch, motion, safety, and drive-based solutions.

The Studio 5000 environment is the foundation for the future of Rockwell Automation® engineering design tools and capabilities. It is the one place for design engineers to develop all the elements of their control system.

In This Manual

This manual describes how Logix5000 controllers use connections with other devices. This manual also describes status keywords and how to get controller information, such as memory resources. This manual is one of a set of related manuals that show common procedures for programming and operating Logix5000 controllers.

Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication, 1770-4.1.	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

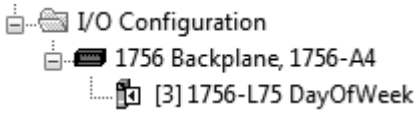
You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

Notes:

Connections

Introduction

A Logix5000 controller uses connections for many, but not all, of its communication with other devices.

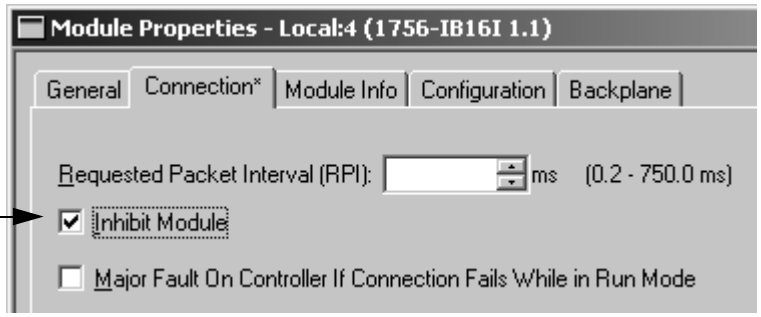
Term	Definition
Connection	A communication link between two devices, such as between a controller and an I/O module, PanelView terminal, or another controller. Connections are allocations of resources that provide more reliable communication between devices than unconnected messages. The number of connections that a single controller can have is limited. You indirectly determine the number of connections the controller uses by configuring the controller to communicate with other devices in the system. These communication types use connections: • I/O modules • Produced and consumed tags • Certain types of Message (MSG) instructions (not all types use a connection)
Requested packet interval (RPI)	The RPI specifies the period at which data updates over a connection. For example, an input module sends data to a controller at the RPI that you assign to the module. • Typically, you configure an RPI in milliseconds (ms). The range is 0.2 ms (200 microseconds)…750 ms. • If a ControlNet network connects the devices, the RPI reserves a slot in the stream of data flowing across the ControlNet network. The timing of this slot may not coincide with the exact value of the RPI, but the control system guarantees that the data transfers at least as often as the RPI.
Path	The path describes the route that a connection takes to get to the destination. Typically, you automatically define the path for a connection when you add the devices to the I/O Configuration folder of the controller. 

Inhibit a Connection

In some situations, such as when initially commissioning a system, it is useful to disable portions of a control system and enable them as you wire the control system. The controller lets you inhibit individual modules or groups of modules, which prevents the controller from trying to communicate with the modules.

ATTENTION: Inhibiting a module breaks the connection to the module and prevents communication of I/O data.

Inhibit communication with the module



When you configure an I/O module, it defaults to being not inhibited. You can change an individual module's properties to inhibit a module.

If you want to	Then
Communicate with the module	Do not inhibit the module
Prevent communication with the module	Inhibit the module

When you inhibit a communication bridge module, the controller shuts down the connections to the bridge module and to all the modules that depend on that bridge module. Inhibiting a communication bridge module lets you disable an entire branch of the I/O network.

When you inhibit the module, the Controller Organizer displays a yellow attention symbol ⚠ over the module.

If you are	And you	And	Then
Offline	→	→	The inhibit status is stored in the project. When you download the project, the module still is inhibited.
Online	Inhibit a module while you are connected to the module	→	The connection to the module is closed. The modules' outputs go to the last configured Program mode.
	Inhibit a module but a connection to the module was not established (perhaps due to an error condition or fault)	→	The module is inhibited. The module status information changes to indicate that the module is inhibited and not faulted.
	Uninhibit a module (clear the check box)	No fault occurs	A connection is made to the module and the module is dynamically reconfigured (if the controller is the owner-controller) with the configuration you created for that module. If the controller is configured for listen-only, it cannot reconfigure the module.
		Fault occurs	A connection is not made to the module. The module status information changes to indicate the fault condition.

Follow these steps to inhibit or uninhibit a module from logic.

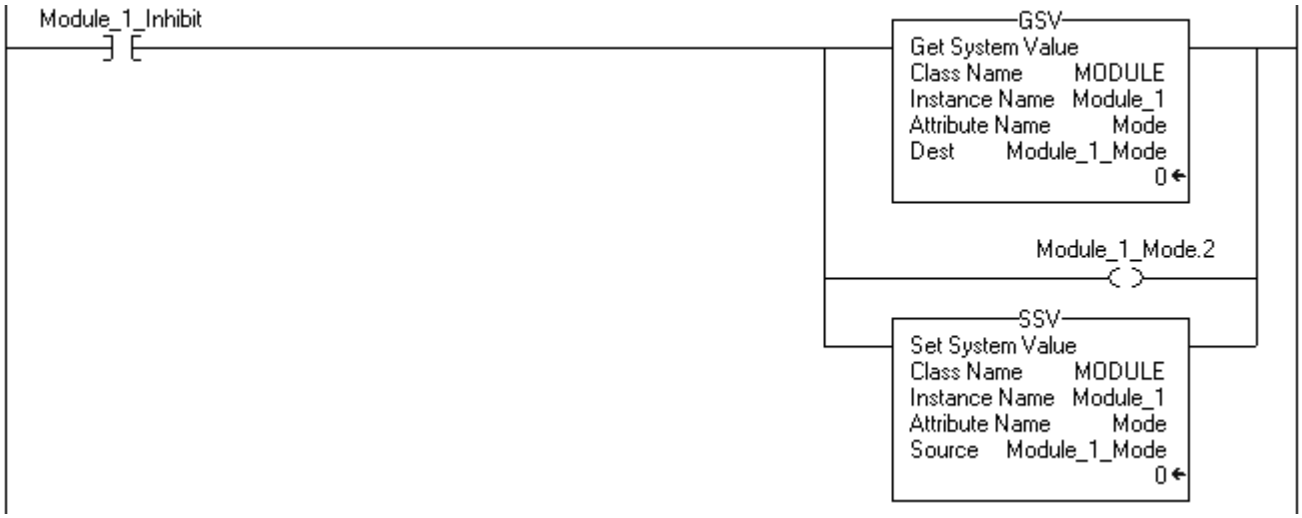
1. Use a Get System Value (GSV) instruction to read the Mode attribute for the module.
2. Set or clear bit 2.

If you want to	Then
Inhibit the module	Set bit 2
Uninhibit the module	Clear bit 2

3. Use a Set System Value (SSV) instruction to write the Mode attribute back to the module.

EXAMPLE **Inhibit a Connection**

If Module_1_Inhibit = 1, then inhibit the operation of the I/O module named Module_1.
1. The GSV instruction sets Module_1_Mode = value of the Mode attribute for the module.
2. The OTE instruction sets bit 2 of Module_1_Mode = 1. This means inhibit the connection.
3. The SSV instruction sets the Mode attribute for the module = Module_1_Mode.



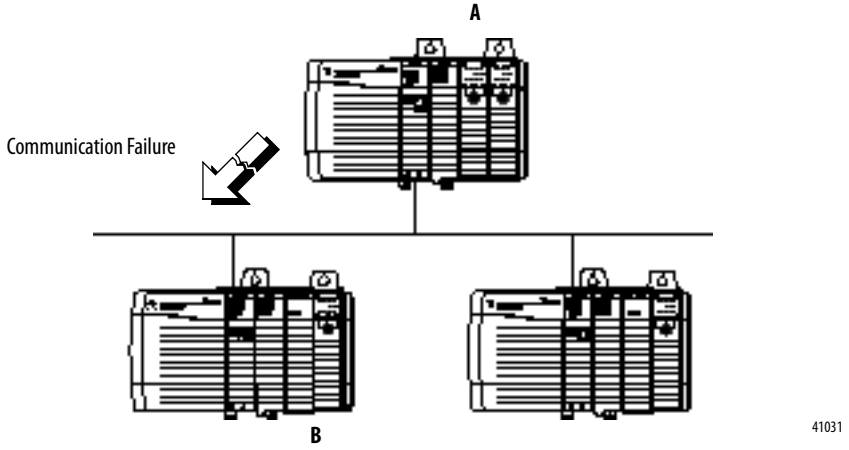
Manage a Connection Failure

If the controller loses communication with a module, data from that device does not update. When this occurs, the logic makes decisions on data that may or may not be correct. This section explains how to program a controller to fault.

ATTENTION: Outputs respond to the last, non-faulted state of the controlling inputs. To avoid potential injury and damage to machinery, make sure this does not create an unsafe operation. Configure critical I/O modules to generate a controller major fault when they lose their connections to the controller: or, monitor the status of I/O modules.

EXAMPLE **Loss of Communication**

ATTENTION: Controller B requires data from controller A. If communication fails between the controllers, then controller B continues to act on the last data that it received from controller A.



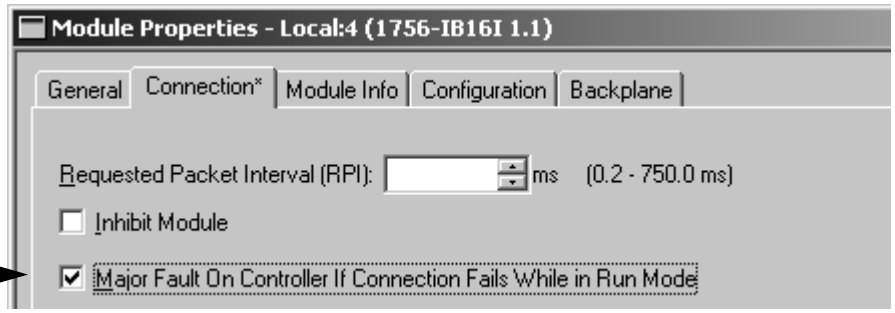
If communication with a device in the I/O configuration of the controller does not occur for 100 ms, the communication times out. If this occurs, you have these options.

If you want the controller to	Then
Fault (major fault)	Configure a Major Fault to Occur
Continue operating	Monitor the Health of a Module

Configure a Major Fault to Occur

You can configure modules to generate a major fault in the controller if they lose their connection with the controller. This interrupts the execution of logic and executes the Controller Fault Handler. If the Controller Fault Handler does not clear the fault, then the controller shuts down.

If the connection times out, produce a major fault in the controller.



When you check the 'Major Fault On Controller...Run Mode' box, the controller:

- must be connected to the module during the Program transition to Run mode. During the Program to Run mode transition, there can be a 20-second delay.

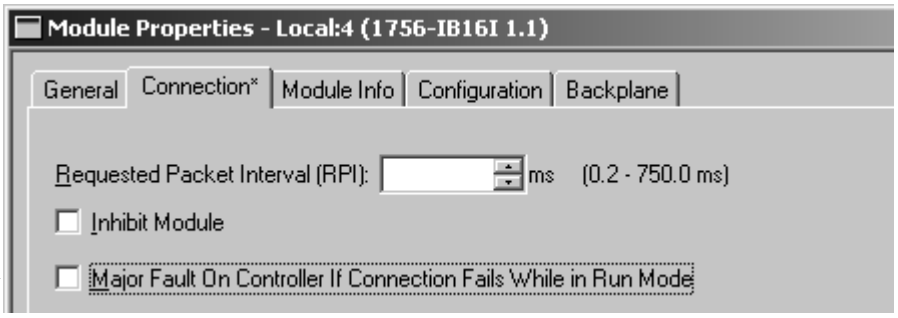
  During this delay, the controller makes one attempt to connect to a module. If the 'Major Fault On Controller...Run Mode' box is selected, and you cannot connect during the 20-second delay, a fault occurs because at least one required connection is not established before going to Run mode. This is a 3/23 type fault code. This fault can occur in large systems with networked I/O.
- will fault if the connection is dropped while in Run mode. A required I/O module connection failed, creating a 3/16 type fault.

For fault codes, see the Logix5000 Controllers Major and Minor Faults Programming Manual, publication 1756-PM014.

Monitor the Health of a Module

If you do not configure the major fault to occur, you should monitor the module status. If a module loses its connection to the controller, outputs go to their configured faulted state. The controller and other I/O modules continue to operate based on old data from the module.

If the connection times out, continue operation without invoking a major fault on the controller.



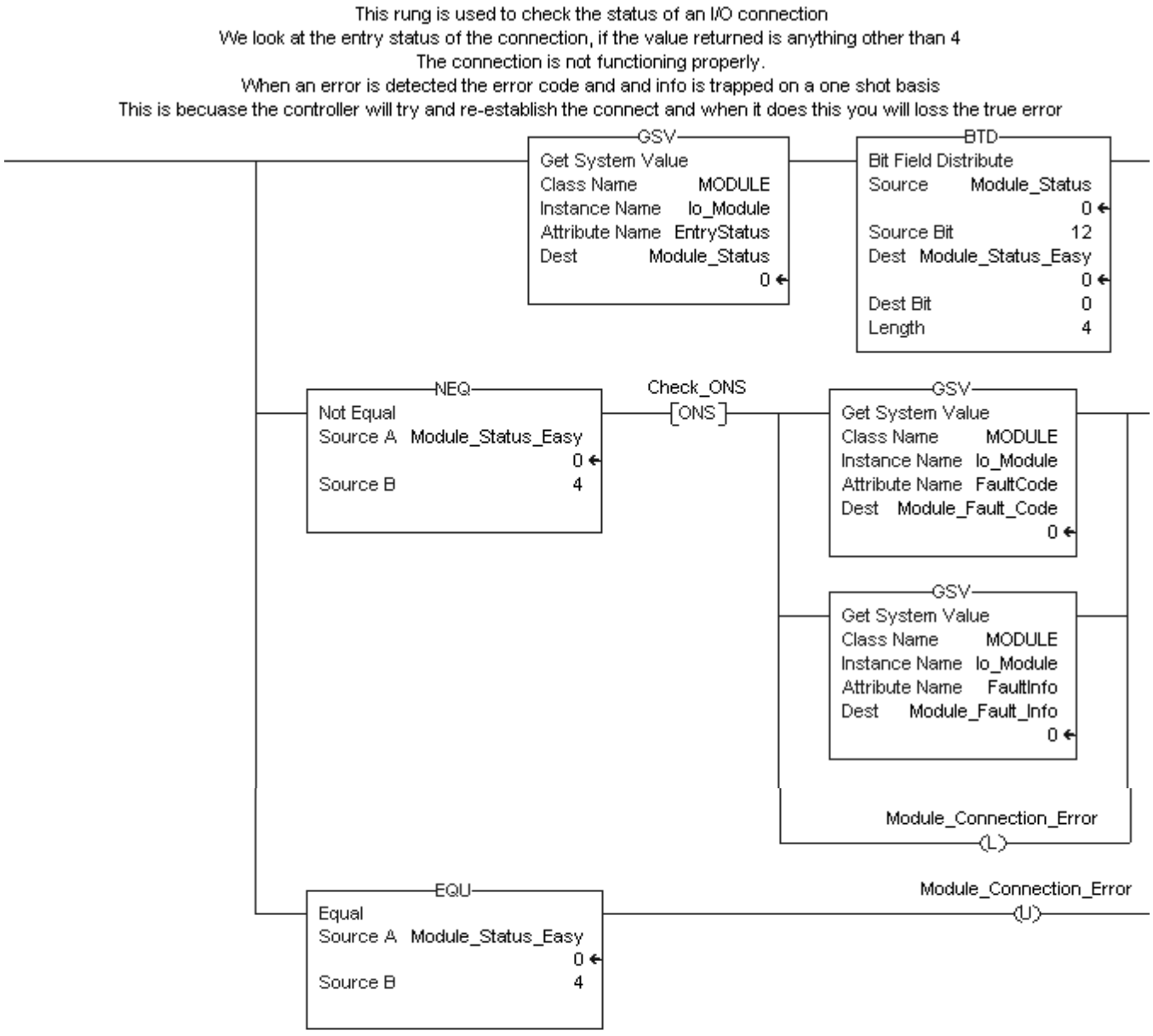
If communication with a module times out, the controller produces these warnings:

- The I/O status indicator on the front of the controller flashes green.
- A ⚠ shows over the I/O configuration folder and over the device that has timed out.
- A module fault code is produced, which you can access through:
  - Module Properties window for the module.
  - GSV instruction.

To monitor the health of your connections, use a Get System Value (GSV) instruction to monitor the MODULE object for either the controller or a specific module.

If you want to	Get this attribute	Data Type	Description	
Determine if communication has timed out with any device	LEDStatus	INT For efficiency, use a DINT as the destination data type.	Specifies the current state of the I/O status indicator on the front of the controller. You do not enter an instance name with this attribute. This attribute applies to the entire collection of modules.	
			Value	**Meaning**
			0	**Status Indicator off:** No MODULE objects are configured for the controller (there are no modules in the I/O Configuration section of the controller organizer).
			1	Flashing red: None of the MODULE objects are Running.
			2	Flashing green: At least one MODULE object is not Running.
			3	Solid green: All the Module objects are Running.
Determine if communication has timed out with a specific device	FaultCode	INT For efficiency, use a DINT as the destination data type.	A number that identifies a module fault, if one occurs. In the Instance Name, choose the device whose connection you want to monitor. Make sure to assign a name to the device in the I/O Configuration folder of the project.	

If Module_Status is any value other than 4, the controller is not communicating with the module. See the example below.



Notes:

Determine Controller Memory Information

Introduction

Depending on your type of controller, the memory of the controller may be divided into several areas.

If you have this controller	Then it stores this	In this memory
1756 ControlLogix 1756 GuardLogix 1768 CompactLogix 1768 Compact GuardLogix	I/O tags	I/O memory
	Produced / Consumed tags	
	Communication via Message (MSG) instructions	
	Communication with workstations	
	Communication with polled (OPC/DDE) tags that use RSLinx software(1)	
	Tags other than I/O, produced, or consumed tags	Data and logic memory(2)
	Logic routines	
	Communication with polled (OPC/DDE) tags that use RSLinx software(1)	
1769-L2*x* CompactLogix 1769-L3*x* CompactLogix FlexLogix DriveLogix SoftLogix5800	These controllers do not divide their memory. They store all elements in one common memory area.	

(1) To communicate with polled tags, the controller uses both I/O data and logic memory.

(2) 1756-L55M16 controllers have an additional memory section for logic.

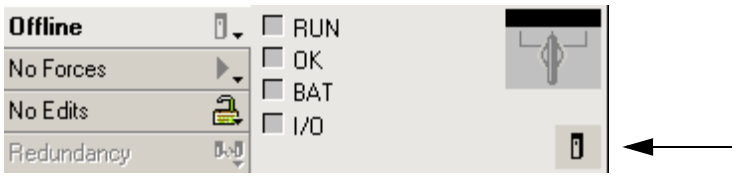
Estimate Memory Information Offline

To estimate how much controller memory your project requires, use the Memory tab of the Controller Properties dialog box. For each of the memory areas of your controller, the dialog box lets you estimate number of bytes of:

- free (unused) memory.
- used memory.
- largest free contiguous block of memory.

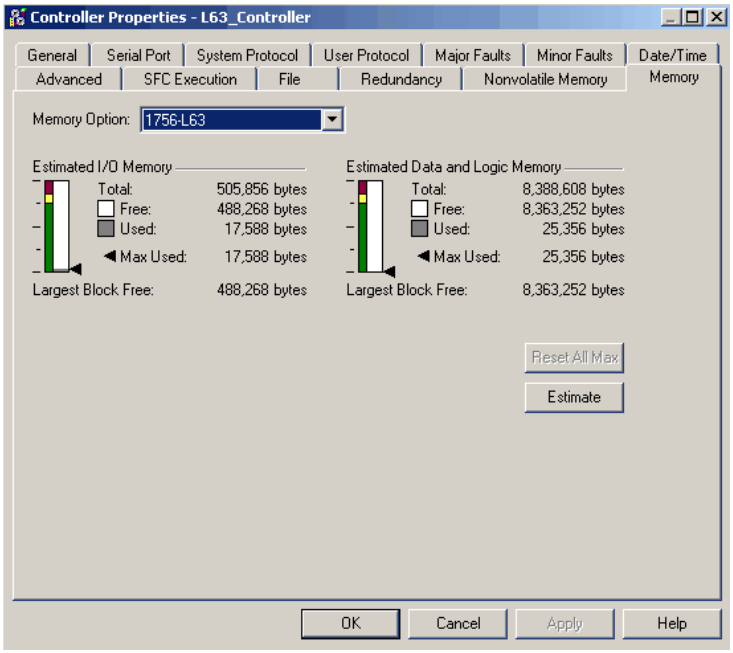
Follow these steps to estimate the controller memory.

1. Start the Logix Designer application and open a controller project.
2. On the Online toolbar (above the Controller Organizer), click the controller properties icon.



   The Controller Properties dialog box appears.

3. Select the Memory tab.



4. In the 'Estimated Data and Logic Memory section', view the memory information since the last estimate.
5. Click Estimate to re-estimate the amount of controller memory.

View Run-time Memory Information

When online with a controller, the Memory tab shows the actual memory usage of the controller. While the controller is running, it uses additional memory for communication. The amount of memory the controller needs varies depending on the state of the communication.

The Memory tab of the controller includes a Max Used entry for each type of memory. The Max Used values show the peak of memory usage as communication occurs.

Follow these steps to reset memory usage.

1. Start the Logix Designer application and open a controller project.
2. On the Online toolbar (above the Controller Organizer), click the controller properties icon.
   The Controller Properties dialog box appears.
3. Select the Memory tab.
4. Click Reset All Max to reset values.
5. Click OK.

Write Logic to Get Memory Information

There are several ways to use logic to get memory information:

- Get Memory Information from the Controller.
- Choose the Memory Information.
- Convert INTs to a DINT.

Get Memory Information from the Controller

To get memory information from the controller, execute a Message (MSG) instruction that is configured as follows.

On this tab	For this item	Type or select	Which means
Configuration	Message Type	CIP Generic	Execute a Control and Information Protocol command.
	Service Type	Custom	Create a CIP Generic message that is not available in the pull-down list.
	Service Code	3	Read specific information about the controller (GetAttributeList service).
	Class	72	Get information from the user memory object.
	Instance	1	This object contains only 1 instance.
	Attribute	0	Null value
	Source Element	*source_array* of type SINT[12]	
		In this element	**Enter** / **Which means**
		source_array[0]	5 – Get 5 attributes.
		source_array[1]	0 – Null value.
		source_array[2]	1 – Get free memory.
		source_array[3]	0 – Null value.
		source_array[4]	2 – Get total memory.
		source_array[5]	0 – Null value.
		source_array[6]	5 – Get largest contiguous block of additional free logic memory.
		source_array[7]	0 – Null value.
		source_array[8]	6 – Get largest contiguous block of free I/O memory.
		source_array[9]	0 – Null value.
		source_array[10]	7 – Get largest contiguous block of free data and logic memory.
		source_array[11]	0 – Null value.
	Source Length	12	Write 12 bytes (12 SINTs).
	Destination	*INT_array* of type INT[29]	
Communication	Path	1, *slot_number_of_controller*	

Choose the Memory Information

The MSG instruction returns the following information to INT_array (destination tag of the MSG).

IMPORTANT The controller returns the values in number of 32-bit words. To see a value in bytes, multiple it by 4.

If your controller does not divide its memory, then the values show up as I/O memory.

For the 1756-L55M16 controller, the MSG instruction returns two values for each logic memory category. To determine the free or total logic memory, of a 1756-L55M16 controller, add both values for the category.

If you want the	Then copy these array elements	Description
Amount of free I/O memory (32-bit words)	*INT_array*[3]	Lower 16 bits of the 32 bit value
	INT_array[4]	Upper 16 bits of the 32 bit value
Amount of free data and logic memory (32-bit words)	*INT_array*[5]	Lower 16 bits of the 32 bit value
	INT_array[6]	Upper 16 bits of the 32 bit value
1756-L55M16 controllers only—amount of additional free logic memory (32-bit words)	*INT_array*[7]	Lower 16 bits of the 32 bit value
	INT_array[8]	Upper 16 bits of the 32 bit value
Total size of I/O memory (32-bit words)	*INT_array*[11]	Lower 16 bits of the 32 bit value
	INT_array[12]	Upper 16 bits of the 32 bit value
Total size of data and logic memory (32-bit words)	*INT_array*[13]	Lower 16 bits of the 32 bit value
	INT_array[14]	Upper 16 bits of the 32 bit value
1756-L55M16 controllers only—additional logic memory (32-bit words)	*INT_array*[15]	Lower 16 bits of the 32 bit value
	INT_array[16]	Upper 16 bits of the 32 bit value
1756-L55M16 controllers only—largest contiguous block of additional free logic memory (32-bit words)	*INT_array*[19]	Lower 16 bits of the 32 bit value
	INT_array[20]	Upper 16 bits of the 32 bit value
Largest contiguous block of free I/O memory (32-bit words)	*INT_array*[23]	Lower 16 bits of the 32 bit value
	INT_array[24]	Upper 16 bits of the 32 bit value
Largest contiguous block of free data and logic memory (32-bit words)	*INT_array*[27]	Lower 16 bits of the 32 bit value
	INT_array[28]	Upper 16 bits of the 32 bit value

Convert INTs to a DINT

The MSG instruction returns each memory value as two separate INTs.

- The first INT represents the lower 16 bits of the value.
- The second INT represents the upper 16 bits of the value.

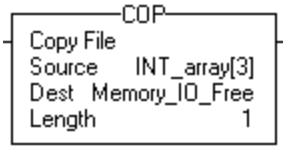
To convert the separate INTs into one usable value, use a Copy (COP) instruction.

In this operand	Specify	Which means
Source	First INT of the 2 element pair (lower 16 bits)	Start with the lower 16 bits.
Destination	DINT tag in which to store the 32-bit value	Copy the value to the DINT tag.
Length	1	Copy 1 times the number of bytes in the Destination data type. In this case, the instruction copies 4 bytes (32 bits), which combines the lower and upper 16 bits into one 32-bit value.

In the following example, the COP instruction produces the 32-bit value that represents the amount of free I/O memory, in 32-bit words.

EXAMPLE **Convert INTs to a DINT**

- Elements 3 of INT_array is the lower 16 bits of the amount of free I/O memory. Element 4 is the upper 16 bits.
- Memory_IO_Free is a DINT tag (32 bits) in which to store the value for the amount of free I/O memory.
- To copy all 32 bits, specify a Length of 1. This tells the instruction to copy 1 times the size of the Destination (32 bits). This copies both element 3 (16 bits) and element 4 (16 bits) and places the 32-bit result in Memory_IO_Free.



Controller Logging

Introduction

The controller logging feature provides a way to detect and log changes made to Logix Controllers without adding any auditing software. With controller logging, the controllers:

- detect changes and create logs entries containing information about the changes.
- store the log entries to removable mediafor later review.
- provide programmatic access to log entry counters to provide change detection information remotely.

Notes:

- The 1769-L3x and 1769-L4x CompactLogix Controllers do not support storing log entries to removable media, and the audit value is not populated.
- The Audit Value is not supported in version 19 or earlier.

Controller Log

A controller log is a record of interactions that have occurred in the controller due to physical conditions like keyswitch and removable media, fault conditions, and programming changes configured in the application. Up to 100 log entries are buffered within the controller's memory. The controller can save these buffered entries to the removable media by using a message instruction. Additionally, the controller can be configured to automatically write buffered entries to the removable media after 80 entries have accumulated.

In the example below, Record Numbers 4-6 are part of the Change Detection feature. See Change Detection on page 45

Table 1 - Example Controller Log File

Record Number	Time	Entry Description	User Name	Workstation Name	FactoryTalk ID	Extended Information	Change Detection Audit Value
1	12-Feb 03:39:34	Project download	John Doe	Laptop	FT\JDoe	Project L71	16#FD60_CB89_029F_3500
2	12-Feb 04:05:12	Forces Enabled	Jones	USMAYLT	FT\Jones		
3	12-Feb 04:22:03	Online edits modified controller program	JohnDoe	Laptop	FT\JDoe		
4	12-Feb 04:42:12	Change Log entry added			FT\JDoe		16#FD60_CB89_029F_3521
5	12-Feb 04:50:43	Change detection mask modified		None	None	Old mask 16#FFFF_FFFF_FFFF_FFFF, New mask 16#FFFF_FFFF_FFFC_FFFF	16#FD60_CB89_029F_3566
6	12-Feb 04:58:29	Change Log entry added		None	None		16#FD60_CB89_029F_35BF

Controller Log Header

When the controller creates a log file on the removable media, it includes some header information. This header information includes the:

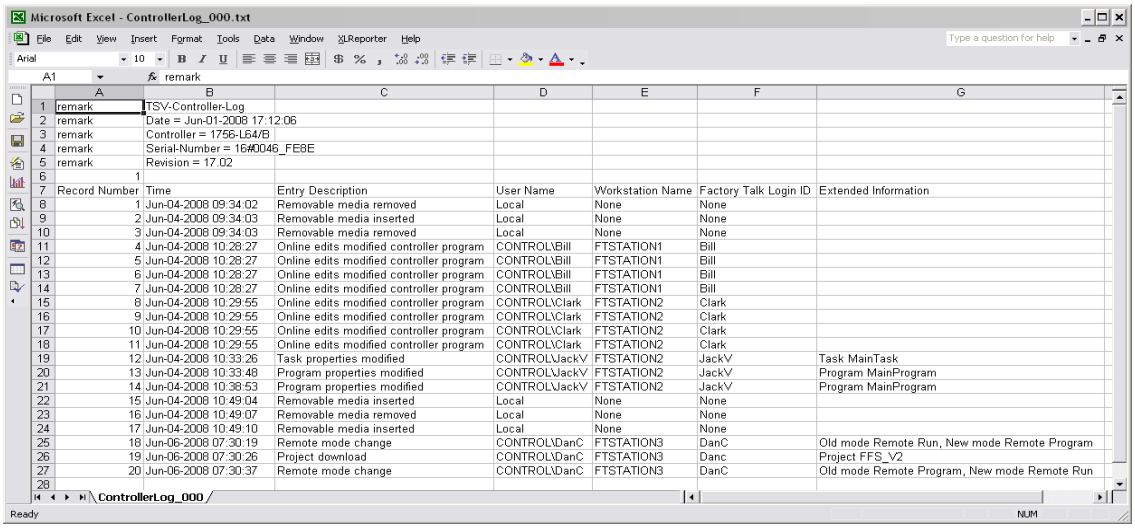
- date the log file was created.
- controller model number.
- controller serial number.
- version of firmware running on the controller.

Controller Log Entry

Each entry in the log can include the following information:

- Record Number
- Time of Occurrence (UTC - 24 hour clock)
- Entry Description
- Windows User Name
- Workstation Name
- FactoryTalk User ID (if available)
- Extended Information
- Change Detection Audit Value (Refer to Controller Change Detection on page 46.)

Figure 1 - Example Excel File of a Controller Log



Microsoft Excel - ControllerLog_000.txt

	A	B	C	D	E	F	G
1	remark	TSV-Controller-Log					
2	remark	Date = Jun-01-2008 17:12:06					
3	remark	Controller = 1756-L64/B					
4	remark	Serial-Number = 16#0046_FE8E					
5	remark	Revision = 17.02					
6		1					
7	Record Number	Time	Entry Description	User Name	Workstation Name	Factory Talk Login ID	Extended Information
8	1	Jun-04-2008 09:34:02	Removable media removed	Local	None	None	
9	2	Jun-04-2008 09:34:03	Removable media inserted	Local	None	None	
10	3	Jun-04-2008 09:34:03	Removable media removed	Local	None	None	
11	4	Jun-04-2008 10:28:27	Online edits modified controller program	CONTROL\Bill	FTSTATION1	Bill	
12	5	Jun-04-2008 10:28:27	Online edits modified controller program	CONTROL\Bill	FTSTATION1	Bill	
13	6	Jun-04-2008 10:28:27	Online edits modified controller program	CONTROL\Bill	FTSTATION1	Bill	
14	7	Jun-04-2008 10:28:27	Online edits modified controller program	CONTROL\Bill	FTSTATION1	Bill	
15	8	Jun-04-2008 10:29:55	Online edits modified controller program	CONTROL\Clark	FTSTATION2	Clark	
16	9	Jun-04-2008 10:29:55	Online edits modified controller program	CONTROL\Clark	FTSTATION2	Clark	
17	10	Jun-04-2008 10:29:55	Online edits modified controller program	CONTROL\Clark	FTSTATION2	Clark	
18	11	Jun-04-2008 10:29:55	Online edits modified controller program	CONTROL\Clark	FTSTATION2	Clark	
19	12	Jun-04-2008 10:33:26	Task properties modified	CONTROL\JackV	FTSTATION2	JackV	Task MainTask
20	13	Jun-04-2008 10:33:48	Program properties modified	CONTROL\JackV	FTSTATION2	JackV	Program MainProgram
21	14	Jun-04-2008 10:38:53	Program properties modified	CONTROL\JackV	FTSTATION2	JackV	Program MainProgram
22	15	Jun-04-2008 10:49:04	Removable media inserted	Local	None	None	
23	16	Jun-04-2008 10:49:07	Removable media removed	Local	None	None	
24	17	Jun-04-2008 10:49:10	Removable media inserted	Local	None	None	
25	18	Jun-06-2008 07:30:19	Remote mode change	CONTROL\DanC	FTSTATION3	DanC	Old mode Remote Run, New mode Remote Program
26	19	Jun-06-2008 07:30:26	Project download	CONTROL\DanC	FTSTATION3	Danc	Project FFS_V2
27	20	Jun-06-2008 07:30:37	Remote mode change	CONTROL\DanC	FTSTATION3	DanC	Old mode Remote Program, New mode Remote Run
28							

Entries Captured in the Controller Log

Below is a list of entries that are detected and logged. These events are described in more detail in Controller Log Events on page 39.

- Project downloaded
- Project loaded from removable media
- Project stored to removable media
- Online edits modified controller program
- Partial import online completed or Tranaction committed
- I/O forces enabled, disabled, removed, or modified
- SFC forces enabled, disabled, removed, or modified
- Firmware update
- Constant tag data changed
- Multiple constant tag data changed

- Change to constant tag configuration reset
- Mode change
- Major fault, major fault cleared
- Program properties modified
- Task properties modified
- Controller timeslice modified
- Removable media inserted or removed
- Safety signature created or deleted
- Safety locked or unlocked
- Custom entry: User-defined logic to create a log entry, with user-defined entry description and extended information
- Safety signature delete inhibited in Run mode
- Safety signature delete allowed in Run mode
- The Changes To Detect value has changed

Controller Log Buffer

The controller keeps up to 100 log entries buffered in its internal memory. If so configured, the controller can write the buffered entries to the removable media when its internal buffer becomes 80% full. Additionally, the controller can be commanded to write the buffered entries to the removable media with a message instruction. This procedure is detailed below. Once a log entry is written to the removable media, it is removed from the buffer.

If the removable media is not present, is full, or if the controller is not configured to automatically write buffered entries to the removable media, and the internal buffer becomes full, entries will continue to be saved in the buffer in a circular fashion. As new entries are stored, the oldest entries will be discarded.

Controller Log Files and the Removable Media

When written to the removable media, controller logs are stored in plain text files in the Tab Separated Value (TSV) format. Each time the controller writes entries to the CompactFlash card, the entries are appended to the text file until the file reaches 1 MB in size. At this point, the controller creates a new text file.

The controller will not attempt to write log entries to a full removable media card. In the event that the removable media becomes full, the system will behave as if the removable media is not present.

As controller log files are stored in plain text files in the TSV format, no special tools are required to read them. They can be opened in any text editor, or in a spreadsheet application, such as Microsoft Excel.

Writing the Controller Log to the CompactFlash Card

The controller log can be written to the CompactFlash card either automatically or on demand.

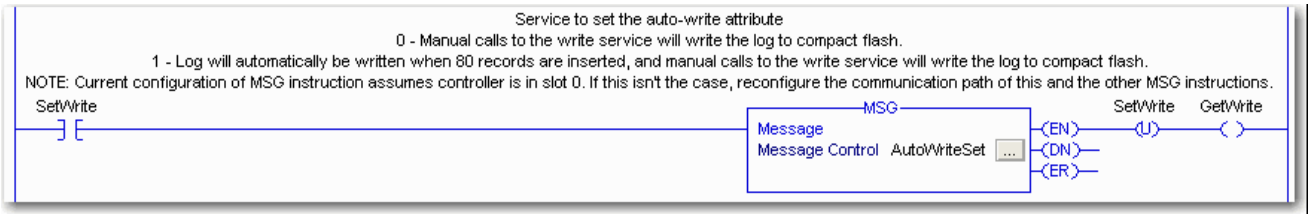
TIP Some Logix controllers support additional types of removable media that can be used to write the controller log entries. Refer to the Logix controller documentation for information regarding the type of removable media your Logix controller supports.

Automatic Save

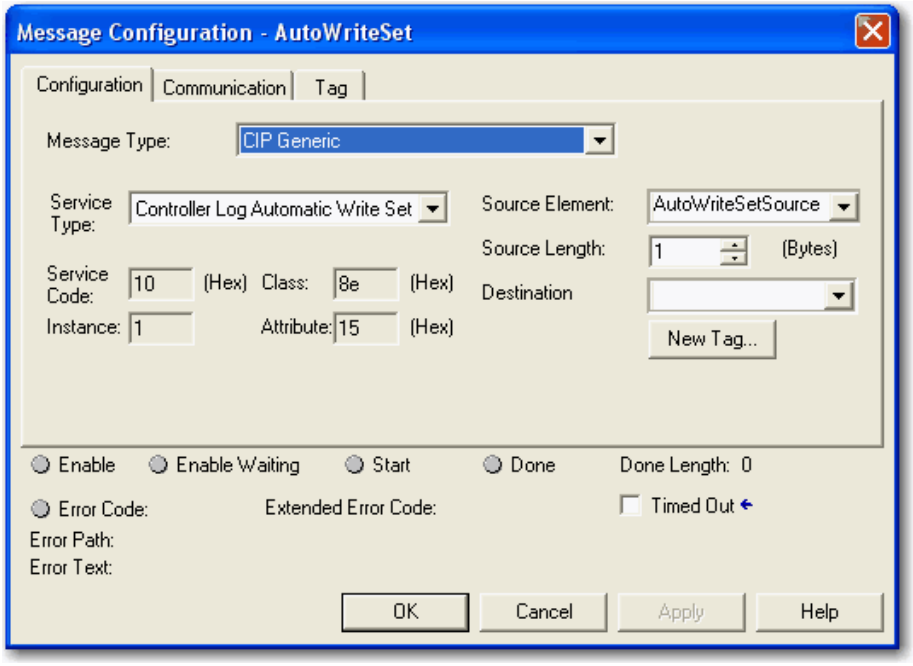
When the controller's internal log entry buffer becomes 80% full, it can automatically write the buffered entries to the CompactFlash card. Additionally, buffered entries can be automatically written before a firmware update. This is configured by sending a message instruction to the controller, using a message type of "CIP Generic" and a service type of "Controller Log Automatic Write Set". Sending a value of 0 will turn off automatic writes, and sending a value of 1 will turn on automatic writes. By default, entries are not automatically written.

A rung of logic that performs this configuration and the configuration dialog box of the message instruction are shown below.

Figure 2 - Automatic Save "Set" Ladder Instruction

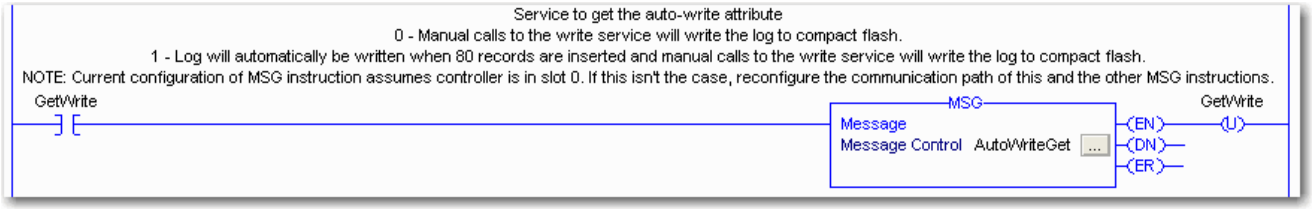


Automatic Save "Set" Configuration Dialog Box

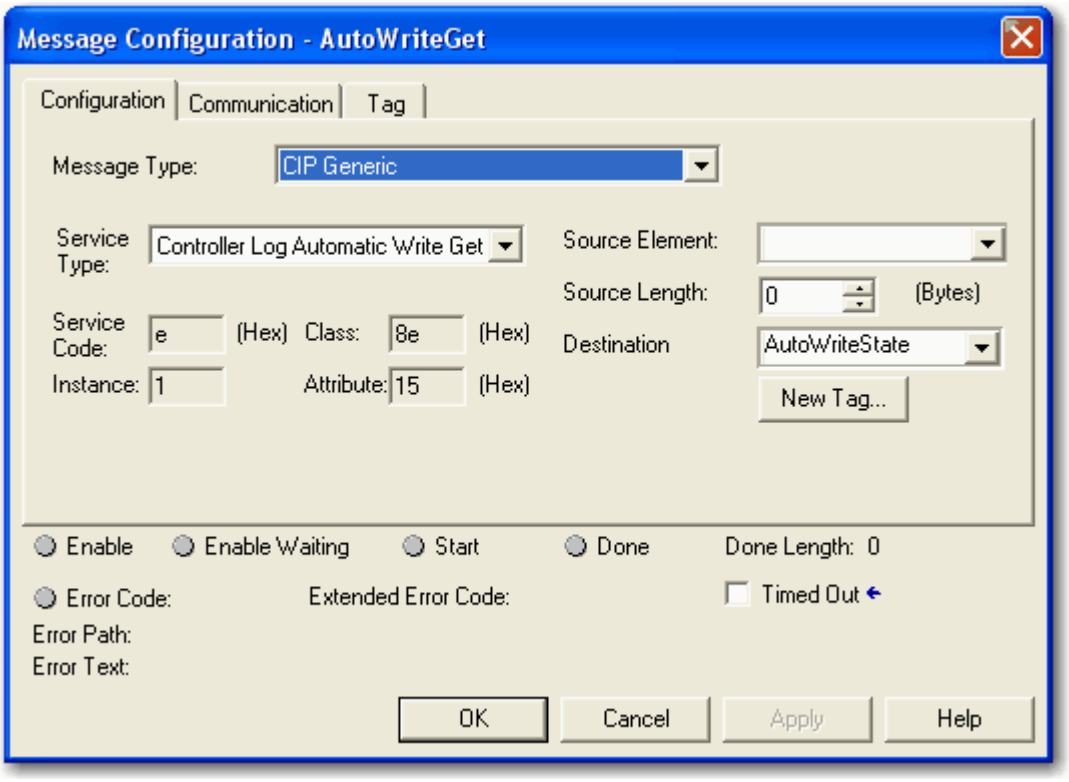


The current state of the automatic write setting can be retrieved by using a message instruction with a message type of "CIP Generic" and a service type of "Controller Log Automatic Write Get". A rung of ladder logic that gets this value and the configuration of the message instruction are shown below.

Automatic Save "Get" Ladder Instruction



Automatic Save "Get" Configuration Dialog Box

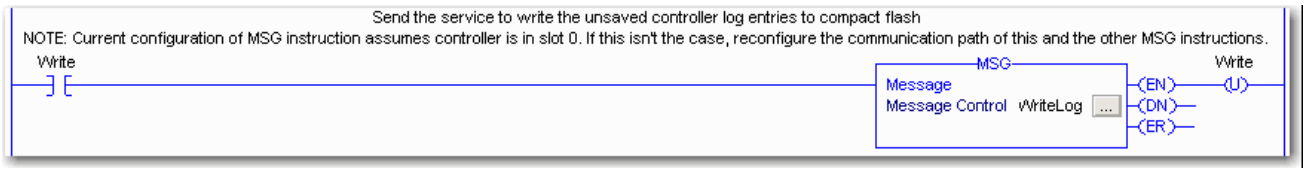


Save On Demand

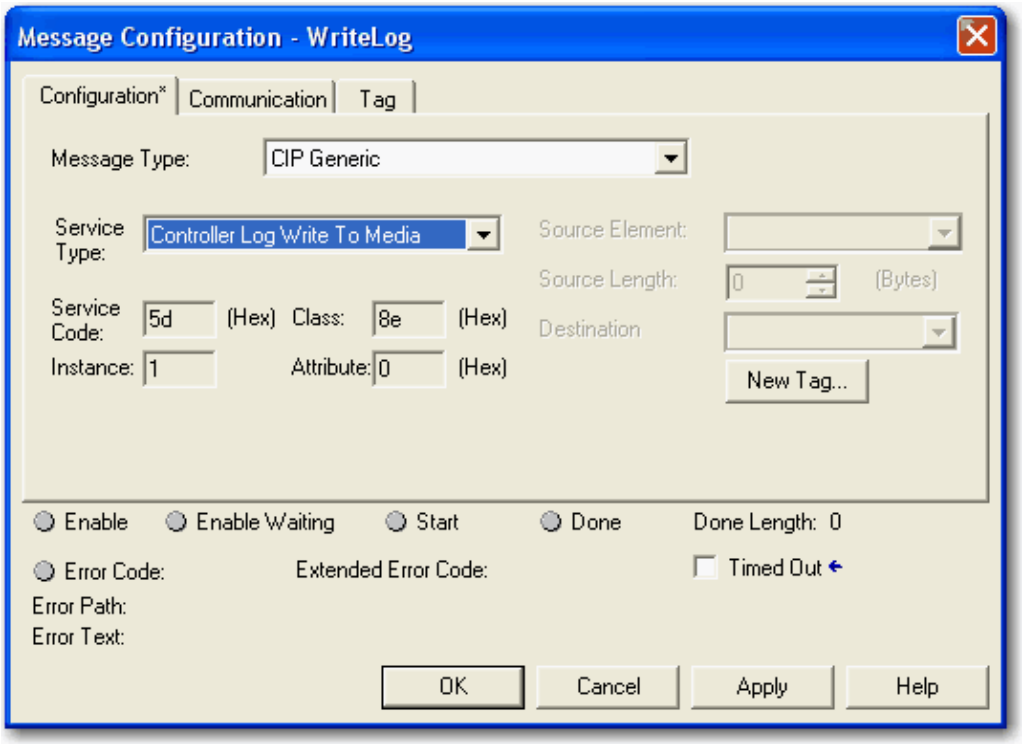
The controller can be commanded to write buffered entries to the CompactFlash card by using a message instruction with a message type of "CIP Generic" and a service type of "Controller Log Write To Media".

A rung of ladder logic that sends this message and the configuration of the message instruction are shown below.

Figure 3 - Write Buffered Entries to the CompactFlash Card Ladder Instruction



Write Buffered Entries to the CompactFlash Card Configuration Dialog Box



Controller Logging Counters

Three counters provide real-time statistics about modifications to the controller..

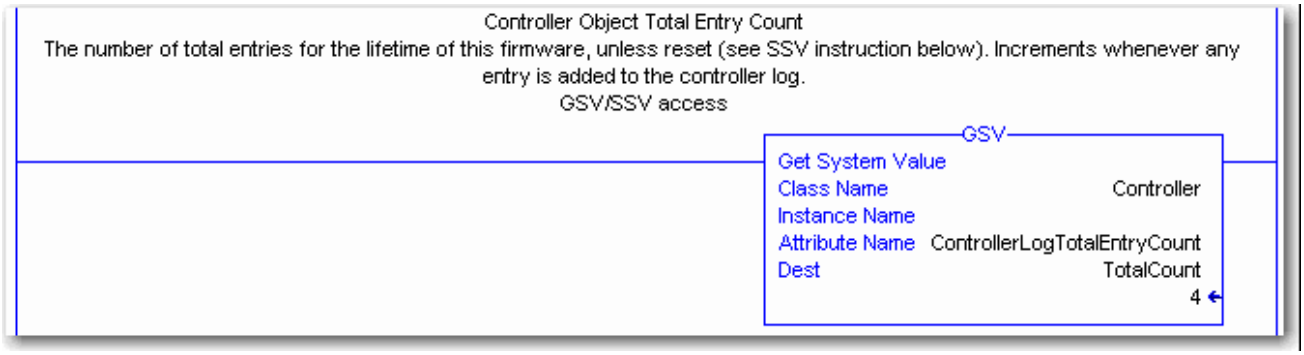
Counter Name	Description	Access
Total Entry Count	Number of entries added to the log since the last firmware update.	GSV/SSV
Unsaved Entry Count	Number of entries in controller RAM not yet written to the CompactFlash card.	GSV
Modify Execution Count	Count that specifically tracks modifications that can change behavior of a running controller. A subset of entries increment this count	GSV/SSV

Total Entry Count

Total Entry Count is the number of controller entries that have been added since the last firmware update. This counter will increment after any entry is added to the log, and it is written to the log in the Record Number field. Using a Set System Value (SSV) instruction, it can be set to a known value. This can be useful, for example, for monitoring system changes during a production run.

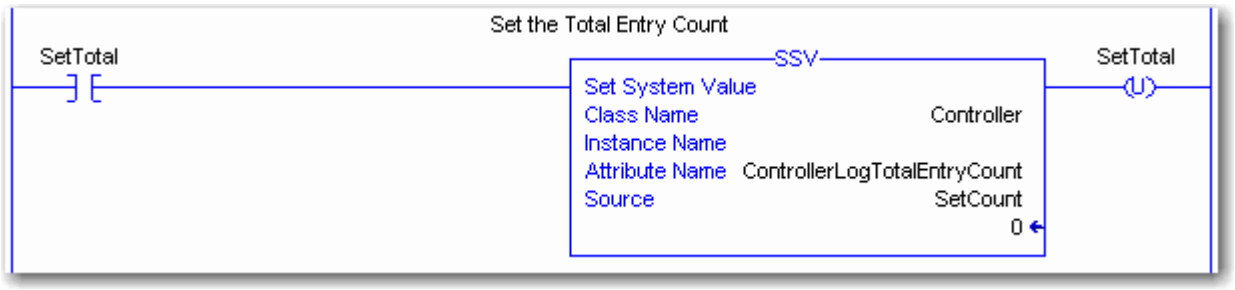
This rung of ladder logic shows how to retrieve the Total Entry Count by using a Get System Value (GSV) instruction.

Total Entry Count by Using a Get System Value (GSV) Instruction



This rung of ladder logic shows how to set the Total Entry Count to a known value (in this example, 0) by using an SSV instruction.

Figure 4 - Set the Total Entry Count to a Known Value Instruction



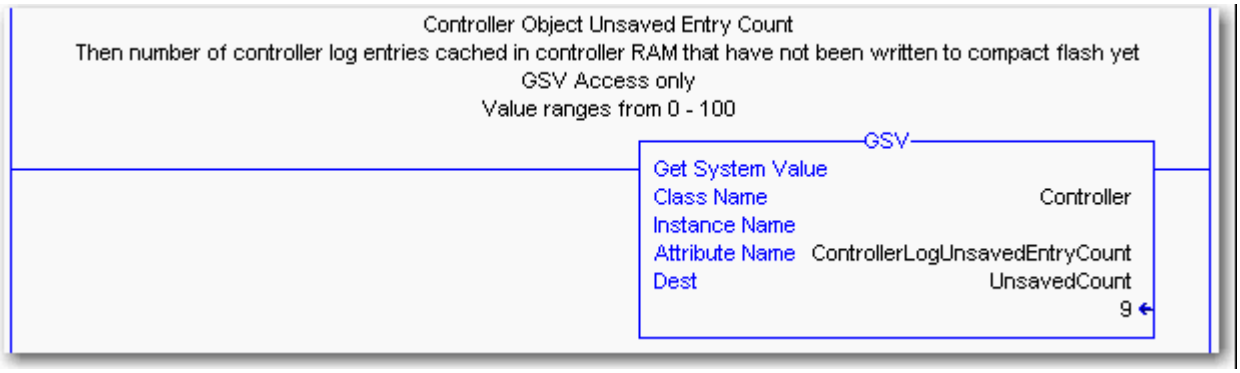
Unsaved Entry Count

The Unsaved Entry Count is the number of log entries that are in controller memory but have not yet been stored to the CompactFlash card.

This counter value is available via a GSV instruction, and can range from 0...100, the maximum number of entries that the controller can buffer.

This rung of ladder logic shows how to retrieve the Unsaved Entry Count by using a Get System Value (GSV) instruction.

Figure 5 - Retrieve the Unsaved Entry Count Using a Get System Value Instruction



Execution Modification Count

The Execution Modification Count tracks the number of changes that occur that can change the behavior of a running controller. This counter can be configured to include or exclude force changes.

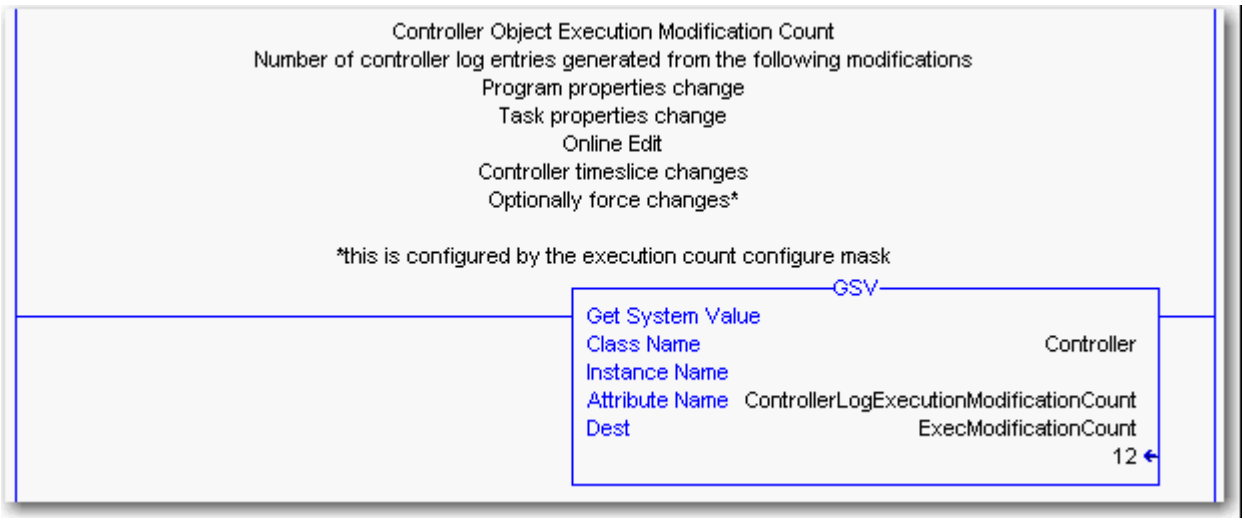
The events that will cause the Execution Modification Count to increment include the following:

- Online edits tested or assembled
- Forces enabled or disabled (if so configured)
- Program properties modified
- Task properties modified
- Controller timeslice modified

This counter can be set to a known value by using an SSV instruction.

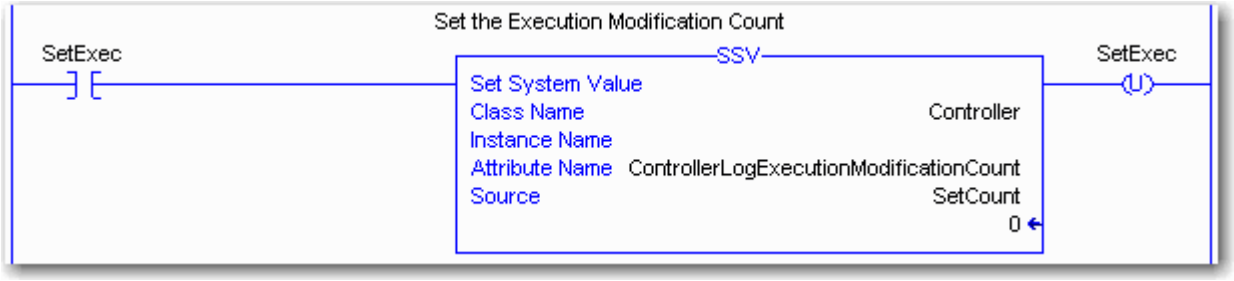
This rung of ladder logic shows how to retrieve the Execution Modification Count by using a GSV instruction.

Figure 6 - Retrieve the Execution Modification Count by Using a GSV Instruction



This rung of ladder logic shows how to set the Execution Modification Count to a known value.

Figure 7 - Set the Execution Modification Count to a Known Value



A message instruction of message type “CIP Generic” and a service type of “Controller Log Config Execution Set” is used to configure whether the Execution Modification Count includes forces.

If it is sent a value of 1, forces will be included in the counter. If it is sent a value of 0, forces will not be included.

The rung of ladder logic below shows how to send the message instruction. The configuration dialog box of the message instruction is also shown.

Figure 8 - Set the Execution Count Configure Mask Instruction

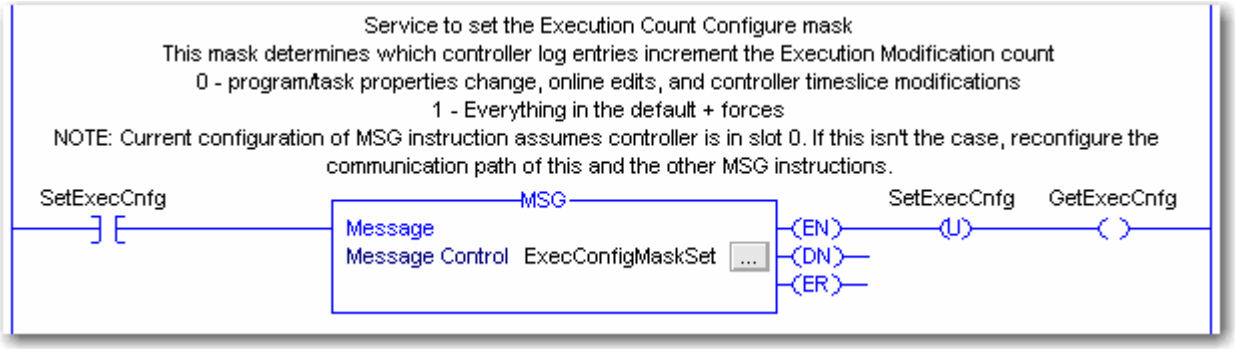
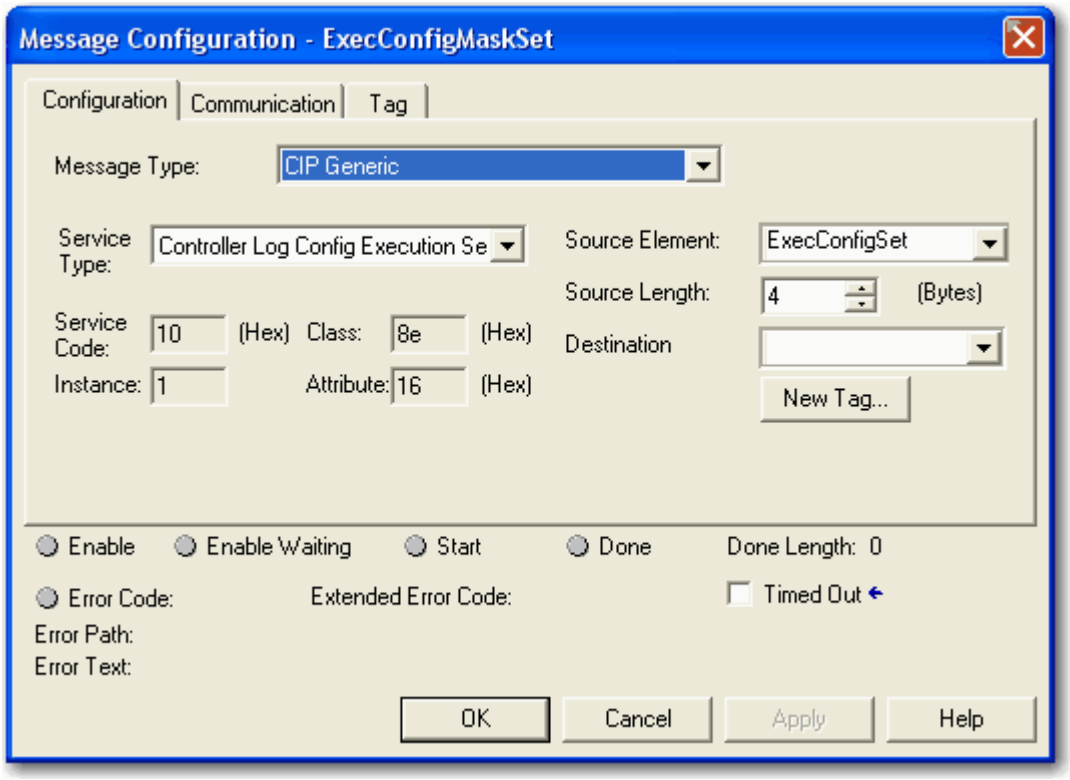


Figure 9 - Set the Execution Count Configure Mask Dialog Box



The Source Element should be of data type DINT.

A message instruction is also used to retrieve the current value of this configuration. This message uses a message type of "CIP Generic" and a service type of "Controller Log Config Execution Get".

The rung of ladder logic below shows how to send the message instruction. The configuration dialog box of the message instruction is also shown.

Figure 10 - Get the Execution Count Configure Mask Instruction

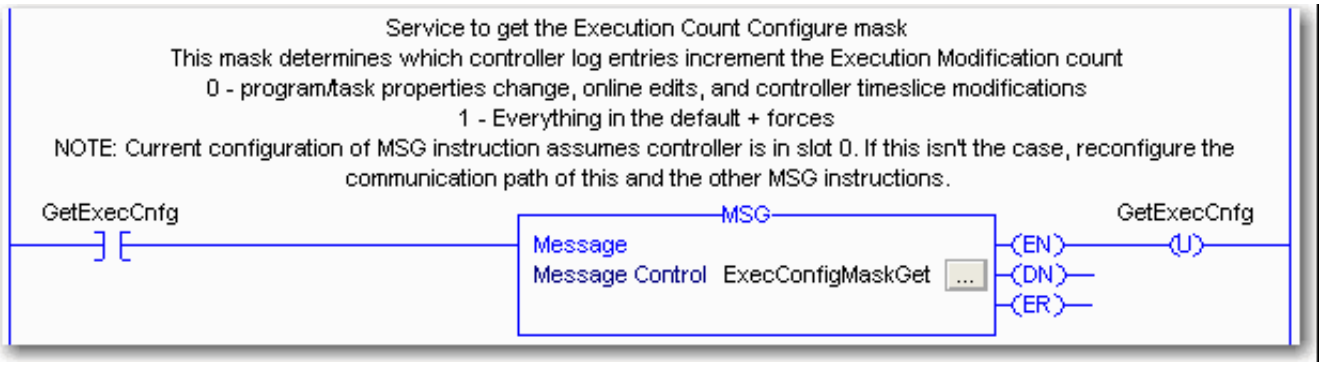
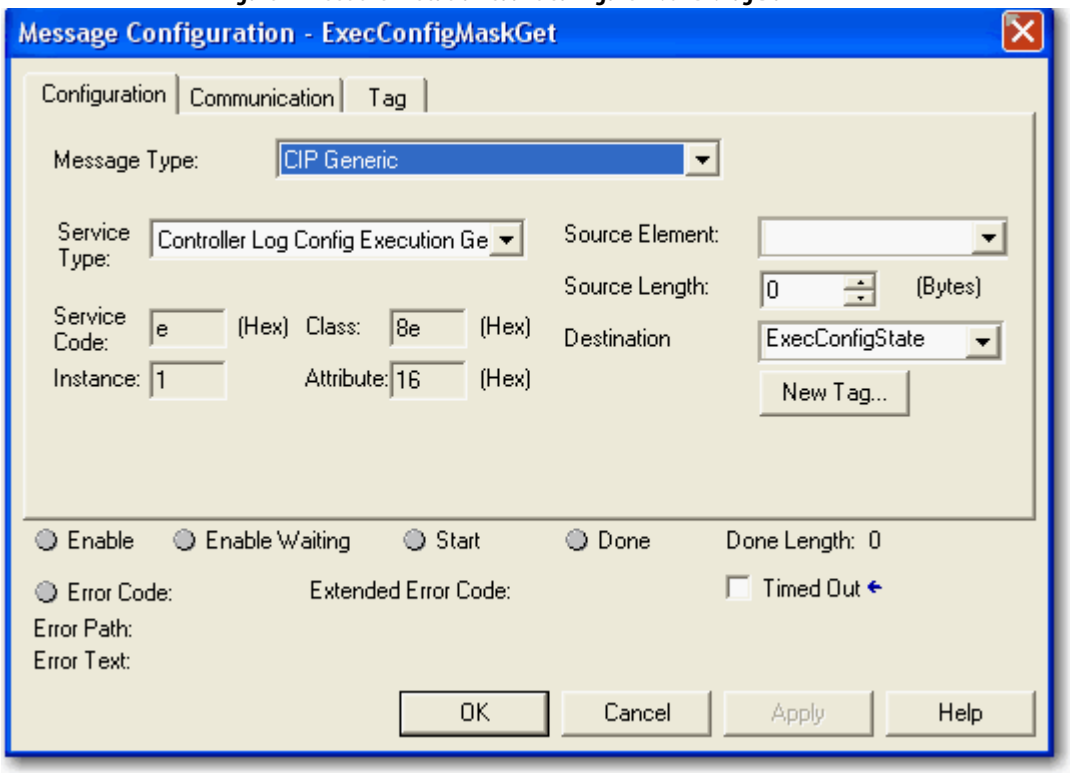


Figure 11 - Get the Execution Count Configure Mask Dialog Box

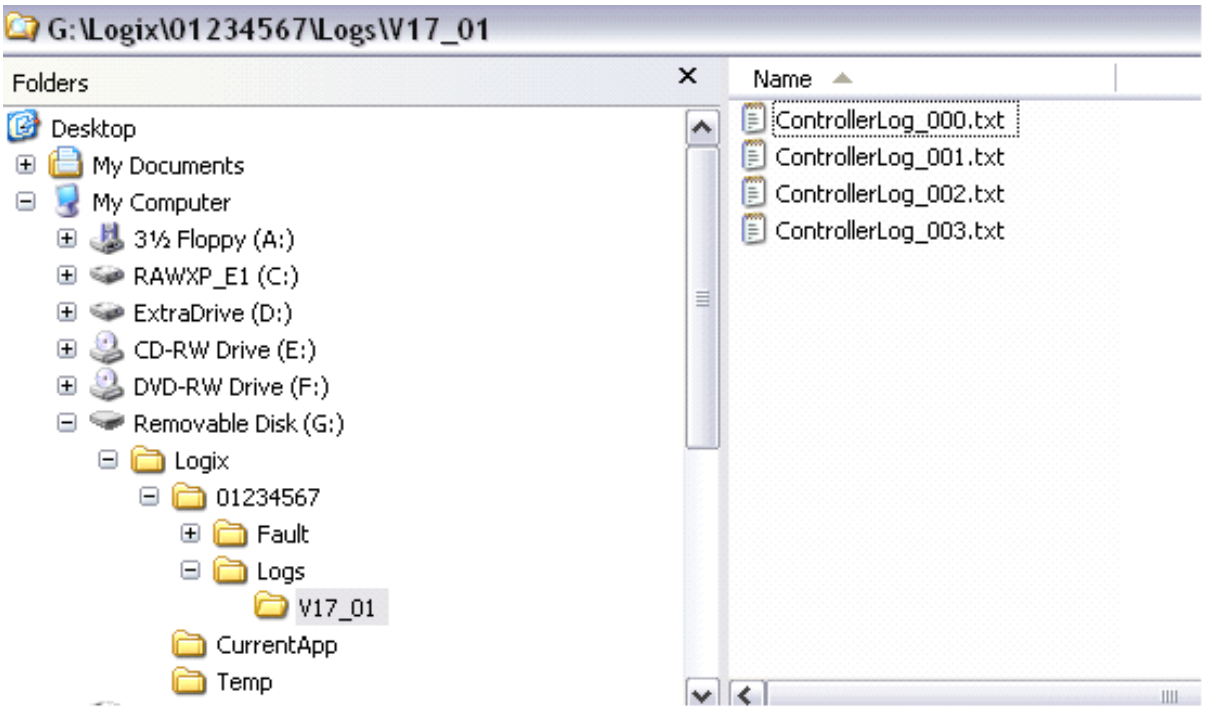


The Destination tag should be of type DINT.

Log File Storage

When a log file is written to the CompactFlash card, it will be stored at "\Logix\XXXXXXXX\Logs\VYY_ZZ", where XXXXXXXX is the eight-digit serial number of the controller and YY_ZZ is the version number of the firmware (major_minor revision).

Figure 12 - Log File Location



The file will be called ControllerLog_yyy.txt where yyy is a sequential number from 000...999. The log file will be appended to until it reaches a size greater than 1 MB. At that point, the next write of the controller log causes a new file to be created with the next sequence number.

Once there are 1000 files larger than 1 MB no more logs will be created. The controller will, however, search for the file name with the smallest possible sequence number that it can create or write to. For example, if a user deletes files 001...100 but leaves the rest, the controller will start creating logs again starting at a sequence number of 001. If there are already 1000 log files and a user deletes log entries out of file 005, the controller will write the next log entries to that file. The controller starts at 000 and looks for the first file that does not exist or is less than 1 MB in size.

Each time the controller opens a log file for writing, it creates a back-up file that is a copy of the log file before the write. This file is called Backup.txt. The backup is overwritten every time a log file is opened for writing.

Users are responsible for periodically clearing space on the card for new log files. The controller does not delete any files off of the card to create more space for new log files.

Log File Format

The following table lists the information that is contained in the controller log file.

Content	Description	Format
Time	Controller's GMT time.	MMM-DD-YY HH:MM:SS 24-hour time
Entry	Entry Description - Defined in Entry List section.	
User Name	User's login ID.	Windows domain name with display name if available.
Workstation Name	User's computer name.	Computer Name
FactoryTalk ID	User's FactoryTalk login ID.	Alphanumeric characters
Extended Information	Entry specific information. Defined in Entry List section.	
Change Detection Audit Value(1)	Changes to the Audit value	

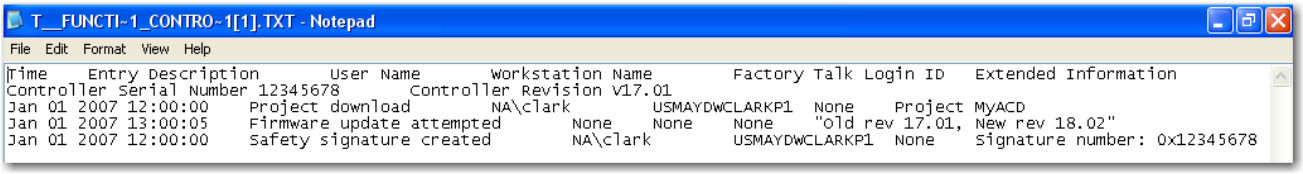
(1) Version 20 or later, see Change Detection on page 45.

The log file is formatted in UTF-16, and has a file extension of .txt. Double-clicking the file will open it in Notepad on most systems. However, since it is formatted as Tab Separated Values (TSV), it can also be opened in a spreadsheet application, like Microsoft Excel.

The following screen is an example of the log file viewed in Notepad.

TIP For version 20 andlater, a column for the Audit Value changes is included in the log file.

Figure 13 - Controller Log File Viewed in Notepad



The following screen is an example of the log file viewed in Excel.

Figure 14 - Controller Log File Viewed in Excel

	A	B	C	D	E	F	G	H	I
1	**Time**	**Entry Description**	**User Name**	**Workstation Nan**	**Factory Talk Lo**	**Extended Informa**	**Controller Serial Nu**	**Controller Revision V17.01**	
2	Jan 01 2007 12:00:00	Project download	NA\clark	USMAYDWCLARK	None	Project MyACD			
3	Jan 01 2007 13:00:05	Firmware update att	None	None	None	Old rev 17.01, New rev 18.02			
4	Jan 01 2007 12:00:00	Safety signature cre	NA\clark	USMAYDWCLARK	None	Signature number: 0x12345678			

Create Custom Log Entries

Custom entries can be added to the controller log by using a message instruction. The message instruction uses a message type of "CIP Generic" and a service type of "Controller Log Add Entry".

The source element of this message should be a tag of a user-defined data type. The user-defined data type should contain two string members. The first string will be put in the log entry's Description field. The second string will be put in the log entry's Extended Information field.

The rung of ladder logic below shows how to send the message instruction. The Configuration dialog box of the message instruction is also shown, as is the definition of the user-defined data type used for the source element.

Figure 15 - Send the Message Instruction

Figure 16 - Controller Log Add Entry Dialog Box

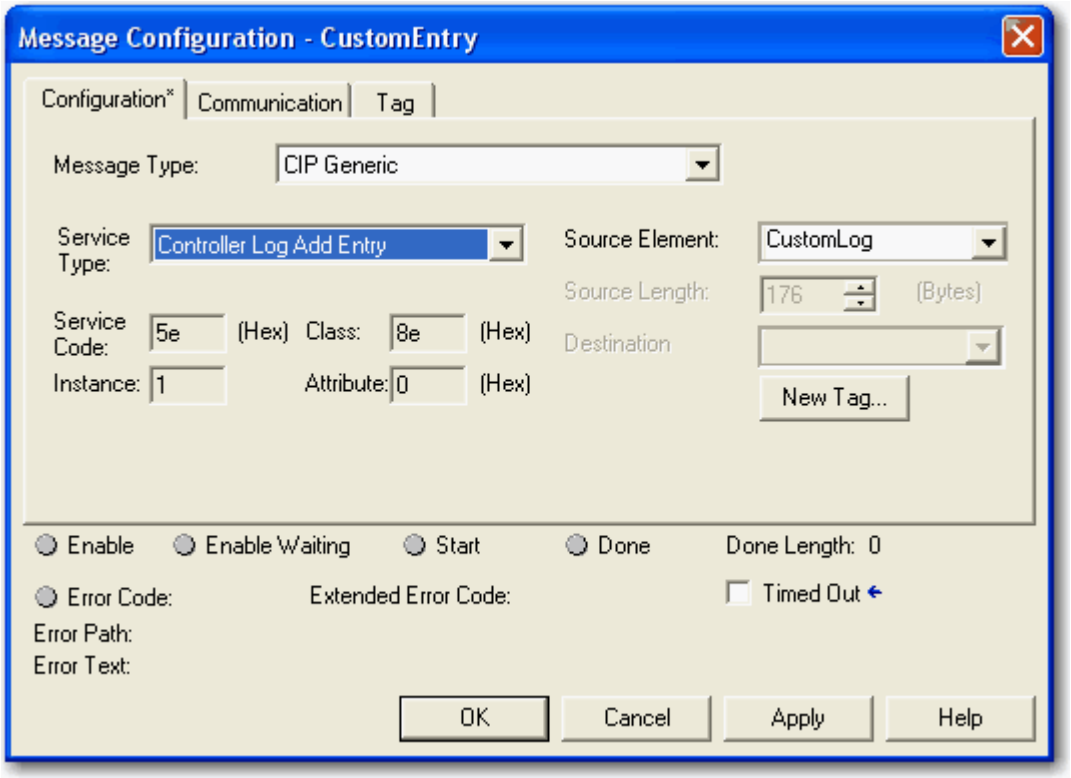
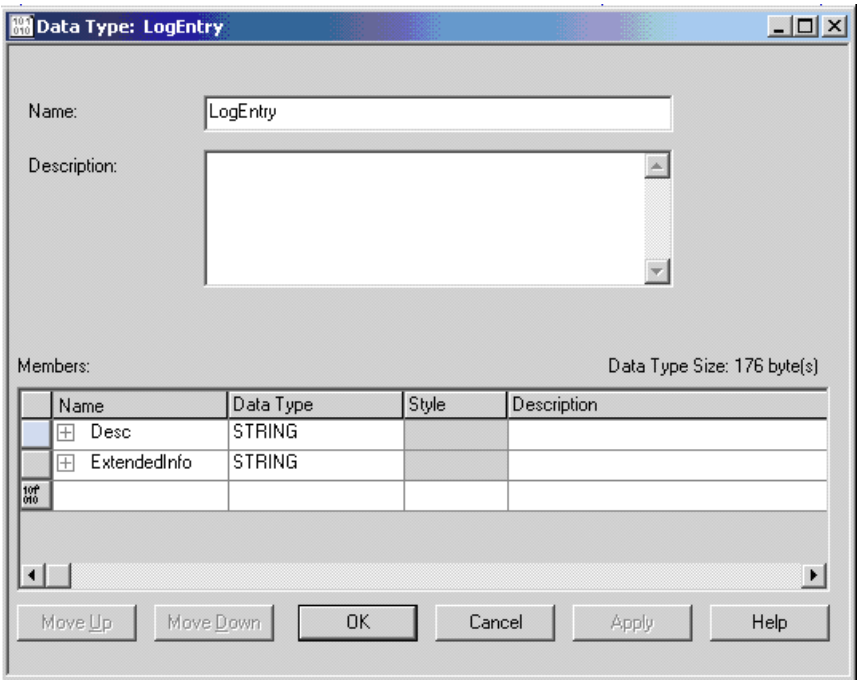
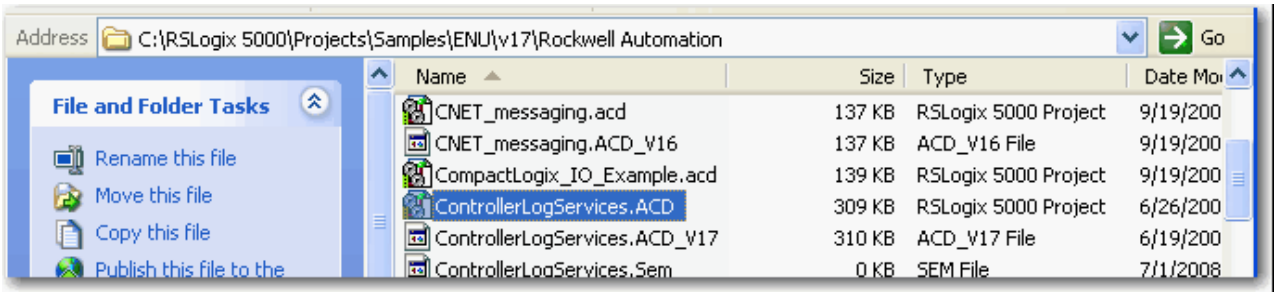


Figure 17 - Example Data Type Dialog Box



Sample Ladder Logic File

In the Logix Designer application, there is a controller logging sample ladder file. If you installed the sample files during the installation, the file ControllerLogServices.ACD will be located at the following location.



Controller Log Events

This table describes the events that the controller stores in the controller log.

Entry	Information Logged
Project download[1]	• Time Stamp • Entry Description: Project download • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Project
Load from removable media	• Time Stamp • Entry Description: Project load • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Project
Load from removable media auto-initiated	• Time Stamp • Entry Description: Project auto load • UserName: Local • Workstation Name: None • FactoryTalk Login Id: None • Extended Information: Project
Store to removable media	• Time Stamp • Entry Description: Project store • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Project
Online edits tested or assembled	• Time Stamp • Entry Description: Online edits modified controller program • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None • Edits logged are: - Test Program Edits - UnTest Program Edits - Assemble Program Edits - Accept Program Edits - Accept Pending Rung Edits
Partial import online completed[2]	• Time Stamp • Entry Description: Partial import online modified controller • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
I/O forces enabled	• Time Stamp • Entry Description: I/O forces enabled • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
I/O forces disabled	• Time Stamp • Entry Description: I/O forces disabled • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None

Entry	Information Logged
I/O forces removed	• Time Stamp • Entry Description: I/O forces removed • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
I/O forces modified	• Time Stamp • Entry Description: I/O force value changed • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Tag
SFC forces enabled	• Time Stamp • Entry Description: SFC forces enabled • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
SFC forces disabled	• Time Stamp • Entry Description: SFC forces disabled • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
SFC forces removed	• Time Stamp • Entry Description: SFC forces removed • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
SFC forces modified	• Time Stamp • Entry Description: SFC element force value changed • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Routine
Firmware update from workstation	• Time Stamp • Entry Description: Firmware update attempted • UserName: None • Workstation: None • FactoryTalk Login Id: None • Extended Information: Old revision <major.<minor>, New revision <major.<minor> Where the major and minor revision numbers are each two digits.
Firmware update from removable media	• Time Stamp • Entry Description: Firmware update from removable media attempted • UserName: Local • Workstation: None • FactoryTalk Login Id: None • Extended Information: Old revision <major.<minor>, New revision <major.<minor> Where the major and minor revision numbers are each two digits.

Entry	Information Logged
Mode changed through Logix Designer	• Mode change started Time Stamp • Entry Description: Remote mode change • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Old mode <mode>, New mode <mode> • Possible modes: - Run - Remote Run - Test - Program - Remote Program
Mode changed through keyswitch	• Time Stamp • Entry Description: Keyswitch mode change • UserName: Local • Workstation Name: None • FactoryTalk Login Id: None • Extended Information: Old mode <mode>, New mode <mode> • Possible modes: - Run - Remote Run - Test - Program - Remote Program
Major fault	• Time Stamp • Entry Description: A major fault occurred • UserName: None • Workstation Name: None • FactoryTalk Login Id: None • Extended Information: Fault type <type number>, Fault code <code number>
Major faults cleared	• Time Stamp • Entry Description: All major faults cleared • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
Major faults cleared through key switch	• Time Stamp • Entry Description: All major faults cleared • UserName: Local • Workstation Name: None • FactoryTalk Login Id: None • Extended Information: None
Program properties modified	• Time Stamp • Entry Description: Program properties modified • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Program • Property changes logged: - Inhibit checkbox - Main routine changed - Fault routine changed

Entry	Information Logged
Task properties modified	• Time Stamp • Entry Description: Task properties modified • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Task • Task property changes logged: - Type changed - Inhibit checkbox - Disable Automatic Output Processing to Reduce Task Overhead checkbox - Priority value - Period Value - Execute if no Event occurs within X ms check box - Trigger changed - Trigger Tag changed - Schedule changed/Service operation
Controller time slice modified	• Time Stamp • Entry Description: Controller timeslice modified • UserName • Workstation Name • FactoryTalk Login Id • Extended Information • Changes logged: - System Overhead Time Slice - During unused System Overhead Time Slice radio buttons
Removable media removed	• Time Stamp • Entry Description: Removable media removed • UserName: Local • Workstation Name: None • FactoryTalk Login Id: None • Extended Information: None
Removable media inserted	• Time Stamp • Entry Description: Removable media inserted • UserName: Local • Workstation Name: None • FactoryTalk Login Id: None • Extended Information: None
Safety signature create	• Time Stamp • Entry Description: Safety signature create • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Signature number: 0xYYYYYYYY (hex format)
Safety signature delete	• Time Stamp • Entry Description: Safety signature delete • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Signature number: 0xYYYYYYYY (hex format)
Safety lock	• Time Stamp • Entry Description: Safety lock • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None

Entry	Information Logged
Safety unlocked	• Time Stamp • Entry Description: Safety unlock • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
Custom entry	• Time Stamp • Entry Description: <User supplied string> maximum 40 characters • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: <User supplied info>, maximum 82 characters
Constant tag data changed	• Time Stamp • Entry Description: Constant tag data changed • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Tag: <tag name><old Value> to <new value>
Multiple constant tag data changed	• Time Stamp • Entry Description: Multiple constant tag data changed • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Tag: <tag name>
Change to constant tag configuration reset	• Time Stamp • Entry Description: Constant tag configuration reset • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Tag: <tag name>
Safety signature delete inhibited in Run mode	• Time Stamp • Entry Description: Safety signature delete inhibited in Run mode • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
Safety signature delete allowed in Run mode	• Time Stamp • Entry Description: Safety signature delete allowed in Run mode • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: None
Audit Value Mask Modified	• Time Stamp • Entry Description: Change detection mask modified • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Old mask: 0xFFFF_FFFF_FFFF_FFFF New mask: 0xFFFF_FFFF_FFFF_DFFF
Log Collected Data Cleared	• Time Stamp • Entry Description: Log Collected Data Cleared • UserName • Workstation Name • FactoryTalk Login Id • Extended Information: Log: Alarm Log

(1) In version 20 or later, the Change Detection Audit Value column is included in the controller log. This column is used to record the Audit Value for Change Detection. Refer to Controller Change Detection on page 46.

(2) In version 20 or later, this value in the controller log equates to Transaction committed in the Change Detection mask. See ChangesToDetect Format on page 48.

Change Detection

Introduction

The controller change detection feature provides an additional means of detecting changes made to Logix controllers:

- a unique audit value is generated when a project is downloaded to the controller.
- when a change is detected in the controller, a new audit value is generated.
- ChangesToDetect mask allows you to programatically configure the events to monitor for changes.
- controller change detection is integrated into the Logix Designer application.

IMPORTANT The change detection feature is not supported in version 19 or earlier.

Note:

- Change detection is not available on the RSLogix Emulate 5000 Controller and the SoftLogix5860 Controller, and the audit value is not populated.
- The 1769-L3x and 1769-L4x CompactLogix Controllers do not support storing log entries to removable media.
- Change detection is integrated in FactoryTalk AssetCentre version 4.1 and later. FactoryTalk AssetCentre can be configured to dectect changes in the controller and read the controller's Controller Log.
- Change detection is not integrated with RSMACC utilities.

Controller Change Detection

Two controller attributes are used to support the Change Detection feature in version 20 and later.

Attribute Name	Description	Access
AuditValue	The AuditValue is a unique value that is generated when a project is downloaded to the controller or loaded from removable storage. When a change is detected this value is updated. To specify which changes are monitored, use the ChangesToDetect attribute.	GSV
ChangesToDetect	Used to specify which changes are monitored. When a monitored change occurs, the Audit Value is updated.	GSV/SSV

ChangesToDetect

The ChangesToDetect mask is a 64-bit value. Each bit of the ChangesToDetect mask corresponds to a particular event that could cause the Audit Value to change. See ChangesToDetect Format on page 48.

IMPORTANT Change detection is unavailable on the RSLogix Emulate 5000 Controller and the SoftLogix5860 Controller.

If a bit set to a value of 1, the corresponding event is monitored for changes and when a change for that event occurs the AuditValue updates. If a bit is set to a value of 2, the corresponding event is not monitored and has no affect on the Audit Value. The default Audit Value of: 0xFFFFFFFFFFFFFFFF indicates that all events are monitored.

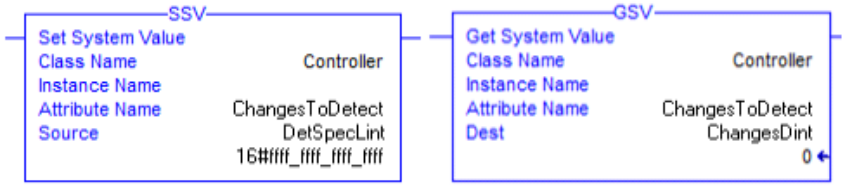
TIP The Audit Value updates when the controller is online.

There are some events that will always update the audit value when they occur. For example, the audit value changes when a project is downloaded to the controller, or when Changes to Detect is reconfigured. These types of events are not included in the Changes To Detect mask.

The ChangesToDetect mask can be configured programatically using SSV, GSV and MSG instructions.

TIP You can use the Security tab in the Controller Properties dialog box to configure Change Detection if you are using version 20 or later of the application. See Change Detection in Logix Designer Application on page 50.

Use the Set System Value (SSV) instruction to write to the ChangesTo Detect attribute and the Get System Value (GSV) instruction to read the ChangesTo Detect attribute programmatically.



TIP We recommend using the DINT[2] data type to avoid limitations when working with LINT data types in Rockwell Automation controllers.

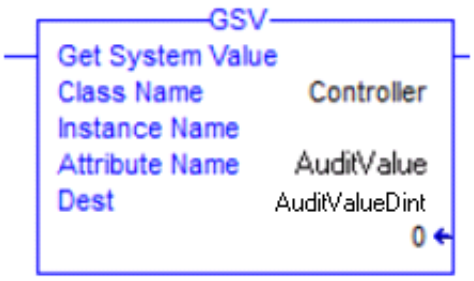
The Message Configuration dialog can be used to read or write to the ChangesToDetect attribute through CIP Generic Messages. For complete information on how to access data using an MSG instruction, refer to Logix5000 Controllers Messages Programming Manual, publication 1756-UM012.

Use these settings to configure the ChangesToDetect attribute using the Message Configuration dialog

If you want to:	In this property	Type or select
Set controller events monitored for changes	Message Type	CIP Generic
	Service Type	Changes to Detect Set
	Source	tag_name of type DINT[2] or LINT 1 This tag represents a bit mask of the changes monitored for the controller.
	Destination	leave blank
Get controller events monitored for changes	Message Type	CIP Generic
	Service Type	Changes to Detect Get
	Source	leave blank
	Destination	tag_name of type DINT[2] or LINT 1 This tag represents a bit mask of the changes monitored for the controller.

AuditValue

Use the Get System Value (GSV) instruction to read the AuditValue attribute programmatically.



The Message Configuration dialog can be used to read the AuditValue attribute through CIP Generic Messages. For complete information on how to access data using an MSG instruction, refer to Logix5000 Controllers Messages Programming Manual, publication 1756-UM012.

Use these settings to read the Audit Value attribute using the Message Configuration.

If you want to:	In this property	Type or select
Get AuditValue	Message Type	CIP Generic
	Service Type	Audit Value Get
	Source	leave blank
	Destination	tag_name of type DINT[2] or LINT 1 This tag contains the AuditValue for the controller.

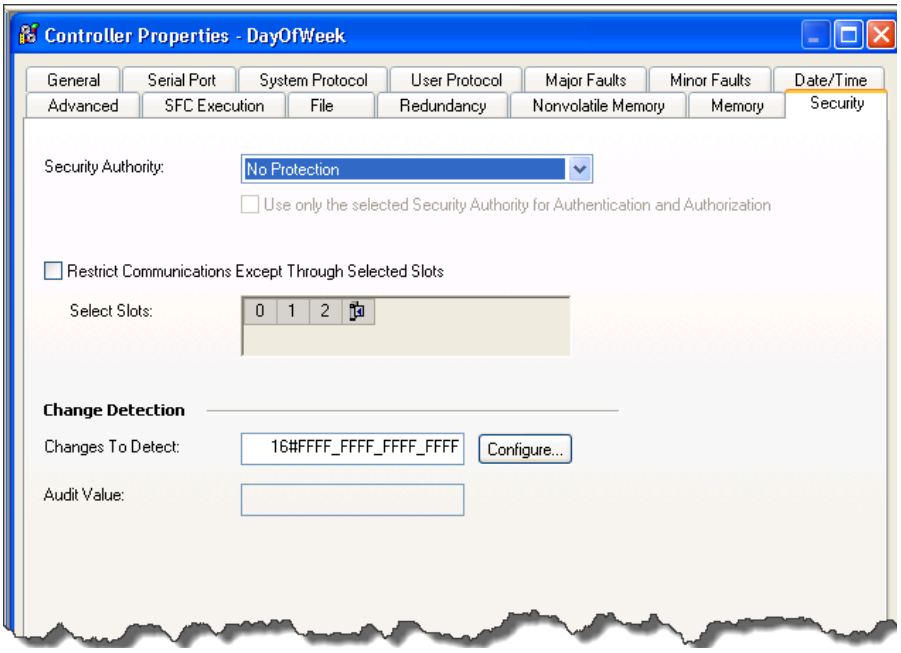
ChangesToDetect Format

Bit number	Event description
0	Project stored to removable media
1	Online edits modified controller program
2	Transaction committed • Indicates that a batch of one or more changes has been applied to the controller. For example, this might happen when a routine is imported online or when a module configuration is changed online.
3	SFC forces enabled
4	SFC forces disabled
5	SFC forces removed
6	SFC element force value changed
7	I/O forces enabled
8	I/O forces disabled
9	I/O forces removed

Bit number	Event description
10	I/O forces modified
11	Firmware update attempted
12	Firmware update from removable media attempted
13	Remote mode change
14	Keyswitch mode change
15	A major fault occurred
16	All major faults cleared
17	All major faults cleared through keyswitch
18	Task properties modified
19	Program properties modified
20	Controller time slice modified
21	Removable media removed
22	Removable media inserted
23	Safety signature created
24	Safety signature deleted
25	Safety lock
26	Safety unlock
27	Constant Tag value changed
28	Multiple constant Tag values changed
29	Constant Tag attribute cleared
30	Constant Tag attribute set
31	Custom Log Entry Added
32	Correlation affected • Indicates a change occurred in the controller that affects the synchronization between the controller and the project file that was downloaded to it. **Tip**: Correlation Affected can include detection of a component being created, deleted, or modified, or logic was modified. Including the Correlation Affected event will update the audit value for these types of changes, even if other similar events (such as "Online edits modified controller program" or "Task properties modified") are masked.
33	Safety signature delete inhibited in Run mode
34	Safety signature delete allowed in Run mode

Change Detection in Logix Designer Application

Version 20 and later of the application provides the Security tab in the Controller Properties dialog that allows users to configure Change Detection.



To edit the Changes To Detect field you can type a new value. To select the events to monitor for changes from a list, click the Configure button to open the Configure Changes to Detect dialog box.

For additional information on how to configure the settings on the Security tab, refer to Logix5000 Security Programming Manual, publication 1756-PM016 or the the online help for the Logix Designer application.

TIP To configure Change Detection programmatically use SSV, GSV or MSG instructions. See Controller Change Detection on page 46

Access Status Information

Introduction

The controller supports status keywords you can use in your logic to monitor specific events.

- The status keywords are not case sensitive.
- Because the status flags can change so quickly, the Logix Designer application does not display the status of the flags. For example, even when a status flag is set, an instruction that references that flag is not highlighted.
- You cannot define a tag alias to a keyword.

You can use these key words.

To determine if	Use
The value you are storing cannot fit into the destination because it is either: • greater than the maximum value for the destination. • less than the minimum value for the destination. **Important:** Each time S:V goes from cleared to set, it generates a minor fault (type 4, code 4)	S:V
The instruction's destination value is 0.	S:Z
The instruction's destination value is negative.	S:N
An arithmetic operation causes a carry or borrow that tries to use bits that are outside of the data type. For example: • adding 3 + 9 causes a carry of 1 • subtracting 25 - 18 causes a borrow of 10	S:C
This is the first, normal scan of the routines in the current program.	S:FS
At least one minor fault has been generated. • The controller sets this bit when a minor fault occurs due to program execution. • The controller does not set this bit for minor faults that are not related to program execution, such as battery low.	S:MINOR

Status of S:FS When the Project Has an SFC

The state of S:FS depends on the status of the SFC.

- If you use S:FS in an action of a sequential function chart (SFC), S:FS is set (on) for one scan each time the step goes active. S:FS = *step_name*.FS.

EXAMPLE SFC Calls a Ladder Diagram

Suppose several steps in an SFC call the same ladder diagram routine. And suppose the ladder diagram uses S:FS. Each time one of those steps goes active, S:FS turns on for one scan of the ladder diagram.

- If the SFC calls a routine, S:FS is set (on) for one scan each time the step that calls the routine goes active. S:FS = *step_name*.FS.

If the SFC does not call a routine, S:FS is set (on) for the first scan of the task.

EXAMPLE Several Tasks but No SFC

Suppose you have two tasks that use ladder diagrams. When the first task runs for the first time, S:FS turns on for one scan. After that, S:FS stays off for that task. When the other task runs for the first time, S:FS turns on for one scan in that task. S:FS stays off in the first task that ran.

Get and Set System Data

The controller stores system data in objects. There is no status file, as in the PLC-5 controller. Use the GSV/SSV instructions to get and set controller system data that is stored in objects.

- The GSV instruction retrieves the specified information and places it in the destination.
- The SSV instruction sets the specified attribute with data from the source.

ATTENTION: Use the SSV instruction carefully. Making changes to objects can cause unexpected controller operation or injury to personnel.

Follow these steps to get or set a system value.

1. Open the project.
2. From the Help menu, choose Contents.
3. Click the Index tab.
4. Type GSV/SSV objects and click Display.

5. Select the object.

To get or set	Select
Customize instructions for commonly-used logic	AddOnInstructionDefinition
Different Axis objects depending on motion application	Axis (Several types)
System-overhead time slice	Controller
Physical hardware of a controller	ControllerDevice
Groups one or more axes to generate coordinated motion	CoordinateSystem
Coordinated system time for the devices in one chassis	CST
DF1 communication driver for the serial port	DF1
Fault history for a controller	FaultLog
Attributes of a message instruction	Message
Status, faults, and mode of a module	Module
Group of axes	MotionGroup
Fault information or scan time for a program	Program
Instance number of a routine	Routine
Different objects for safety	Safety
Configuration of the serial port	SerialPort
Properties or elapsed time of a task	Task
Precision time management for motion control	TimeSynchronize
Wall clock time of a controller	WallClockTime

6. In the list of attributes for the object, identify the attribute that you want to access.

   For attribute information, see the Logix5000 Controllers General Instruction Reference Manual, publication 1756-RM003.

7. Create a tag for the value of the attribute.

If the data type of the attribute is	Then
One element (for example, DINT)	Create a tag for the attribute.
More than one element (for example, DINT[7])	A. Create a user-defined data type that matches the organization of data that is used by the attribute. B. Create a tag for the attribute and use the data type from step A.

8. In the Ladder Logic routine, enter the appropriate instruction.

To	Enter this instruction
Get the value of an attribute	GSV
Set the value of an attribute	SSV

9. Assign the required operands to the instruction:

For this operand	Select
Class name	Name of the object.
Instance name	Name of the specific object (for example, name of the required I/O module, task, message). • Not all objects require this entry. • To specify the current task, program, or routine, select THIS.
Attribute name	Name of the attribute.
Dest (GSV)	Tag that will store the retrieved value. If the tag is a user-defined data type or an array, select the first member or element.
Source (SSV)	Tag that stores the value to be set. If the tag is a user-defined data type or an array, select the first member or element.

This examples gets the current date and time.

EXAMPLE **Get a System Value**

At the first scan, gets the DateTime attribute of the WALLCLOCKTIME object and stores it in the wall_clock tag, which is based on a user-defined data type.

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For more GSV/SSV information, see the Logix5000 Controllers General Instructions Reference Manual, publication 1756-RM003.

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products.
At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

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Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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