

ControlLogix™ Controller

Cat. No. 1756-L1, -L1M1, -L1M2, -L1M3, -L53, -L55, -L55M12, -L55M13, -L55M14, -L55M16, -L55M22, -L55M23, -L55M24, -L63

ATTENTION



If you have a 1756-L63 controller, *do not* edit its ladder logic routines while online. Online edits could cause serious injury to personnel or damage to equipment.

To edit the ladder logic of a 1756-L63 controller while online, first complete the following actions:

1. Update your RSLogix 5000 software to the following revision:

If you have this revision of RSLogix 5000 software:	Update it to this revision:
10.00	10.02
11.00	11.11
11.01	
11.10	

2. While *offline*, open the RSLogix 5000 project for the controller.
3. Save the project.
4. Download the project to the controller.

If you perform an online edit with revision 10.00, 11.00, 11.01, or 11.10 of RSLogix 5000 software, unpredictable controller operation could occur. This may include, but is not limited to:

- watchdog time of a task expires (major fault type 6, code 1)
- controller failure (solid red OK LED)

IMPORTANT

If you have a 1756-L55 controller, you must install a memory board. For more information, see the *ControlLogix Controller and Memory Board Installation Instructions*, publication 1756-IN101.

Introduction

These release notes provide the following information:

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When to Use These Release Notes

These release notes correspond to the following revisions of the ControlLogix family of controllers:

Controller:	Catalog number:	Revision:
ControlLogix5550™	1756-L1, -L1Mx	10.24 or later
ControlLogix5553™	1756-L53	10.24 or later
ControlLogix5555™	1756-L55Mxx	10.27 or later
ControlLogix5563™	1756-L63	10.32 or later

Compatible Revisions

To use this controller revision, update your system as follows:

Update this:	To this revision or later:
RSLinX™ software	2.30 service pack 1
RSLogix 5000™ software	10.00
RSNetWorx™ for ControlNet software	3.21
RSNetWorx for DeviceNet software	3.21
1756-M02AE module	5.2
1756-M08SE module	2.10

Before You Update Your System

Before you update your controller or RSLogix 5000 software to this revision, do the following preliminary actions:

If you have this controller:	And you have:	Then:
1756-L55M23 or -L55M24	a project stored in nonvolatile memory	Check the properties of the nonvolatile memory:
		Is the Load Image property set to <i>User Initiated</i> ?
		If: Yes
		Then: No preliminary action is required. Go ahead and update your system.
		No
		<div>1. In the <i>Load Image</i> drop-down list, select <i>User Initiated</i>.</div> <div>2. Store the project to the nonvolatile memory of the controller.</div>
		Other Load Image selections cause the update of the controller to fail. (You are able to successfully update the controller the second time.)
any	the controller connected to a DH-485 network	<i>Before</i> you update the firmware of the controller, disconnect it from the DH-485 network.

Common Enhancements

This revision of ControlLogix controllers (ControlLogix5550, ControlLogix5553, ControlLogix5555, and ControlLogix5563) contains the following new features:

New Instructions

This instruction:	Lets you:
SWPB	Rearrange the bytes of a value
LOWER	Convert the alphabetical characters in a string to lower case
UPPER	Convert the alphabetical characters in a string to upper case

Expanded MESSAGE Structure

The MESSAGE structure, which controls the execution of message instructions, contains new members. The new members let you use logic to change many of the properties of a message during run time, including:

- path
- channel, rack, group, and slot
- source link, destination link, and destination node
- address of the data in the destination device
- properties of a CIP generic message
- timeout values
- local and remote index (See “Wildcard in the Source and/or Destination of a Message.”)

Wildcard in the Source and/or Destination of a Message

The Message instruction lets you use logic to control the starting element number of the Source and/or Destination array:

- The instruction accepts the asterisk [*] in place of the element number in the Source and Destination arrays. For two and three dimension arrays, you can use the asterisk for only one of the dimensions.
- A corresponding index member stores the actual value to be used in place of the asterisk [*]. You can use different values for the Source and Destination.
- To change the element number, change the value of the index.

Block Transfers over ControlNet

The message instruction now performs block transfers over a ControlNet network. This lets you access modules over this network that require block transfers, such as 1771 analog I/O modules.

Additional Data Types for SLC Messages

The Message instruction lets you exchange 32-bit data with SLC or MicroLogix controllers:

For this controller:	and this data type:	Use this Logix5000 data type:
SLC 500	F	REAL
MicroLogix 1000	F	REAL
MicroLogix 1200	F	REAL
MicroLogix 1500	L	DINT

Pre-configured CIP Generic Messages

In the Message Properties dialog box, a list of CIP messages lets you select a common function for a CIP message. The selection automatically fills in many of the properties for the message.

Reconfigure an I/O Module

A new message type, Module Reconfigure, lets you send new configuration information to an I/O module. During the reconfiguration:

- Input modules continue to send input data to the controller.
- Output modules continue to control their output devices.

This lets you change configuration properties such as set points and alarm values without experiencing a bump.

String Data Types in CMP and FSC Expressions

The CMP and FSC instructions let you use string data types in the expression to compare two strings. For example, the FSC instruction lets you search an array of strings for a specific string of characters.

JSR/SBR/RET Instructions

Enhancements to the JSR/SBR/RET instructions let you:

- use these instructions in function block routines
- use the BOOL data type as an input and return parameter

1756-M12 and -M22 Memory Boards

This revision of controllers lets you use the 1756-M12 and -M22 memory boards. These boards:

- are for 1756-L55 controllers
- provide 750K bytes of user available memory

This board:	Contains nonvolatile memory?
1756-M12	No
1756-M22	Yes

Before you replace an existing memory board (1756-M13, -M14, -M16, -M23, or -M24) with a 1756-M12 or -M22 memory board, update the firmware of the controller to revision 10.27 or later.

Update Firmware As Part of the Download

When you download a project, you have the option of updating the firmware of the controller as part of the download sequence. To use this feature, first install a firmware upgrade kit.

SERCOS Control

ATTENTION



Make sure that each axis on a SERCOS ring uses a unique node number. The controller *cannot* detect if 2 or more axes on a SERCOS ring are set to the same node number. If they are, you will get unexpected operation of the axes.

You can use a ControlLogix controller and a 1756-M08SE motion module to control the following drives:

- 1394 Digital SERCOS™ drive
- 2098 Ultra 3000 SERCOS drive

Four New Axis Data Types

When you update a project to this revision, any tags that use the AXIS data type automatically convert to one of the following new data types:

- AXIS_CONSUMED
- AXIS_SERVO
- AXIS_VIRTUAL

This revision also includes the following new data type, which you use for SERCOS communications:

- AXIS_SERVO_DRIVE

The new data types support new types of motion axes. The data types also let you get data about an axis that was previously only available via a GSV instruction.

Input Number Operand for MAR and MDR Instructions

The MAR and MDR instructions now include an Input Number operand.

Variable Number of Output Cams

When you update a project to this revision, the number of output cam execution targets for each axis is set to 0. Previously this was hard coded to 4.

- This reduces the size of the project by 21.6K bytes per axis.
- To use output camming, configure the axis for the required number of output cam execution targets:
 1. Display the properties for the axis.
 2. On the *General* tab, enter the required number of output cam execution targets.
- You may specify up to 8 output cam execution targets per axis.
- Each execution target increases the size of the project by 5,404 bytes.

Auto Tag Update Property for a Motion Group

The new axis data types include the following new members:

- ActualAcceleration
- ActualPosition
- ActualVelocity
- AverageVelocity
- CommandAcceleration
- CommandPosition
- CommandVelocity
- MasterOffset

To use these members (tags) in your project, enable the Auto Tag Update property for the desired group of axes.

- When you update a project to this release or create a new project, the Auto Tag Update property for each motion group is disabled.
- To enable the Auto Tag Update property for an axis:
 1. Display the properties for the motion group.
 2. Click the *Attribute* tab.
- If you enable the Auto Tag Update property, motion task execution times increase.

Common Changes

This revision of ControlLogix controllers (ControlLogix5550, ControlLogix5553, ControlLogix5555, and ControlLogix5563) contains the following changes:

Removal of the MGPS Instruction

The MGPS instruction is no longer available. When you update your project to this revision, any MGPS instructions automatically convert to MGS instructions with the Stop Mode set to Programmed.

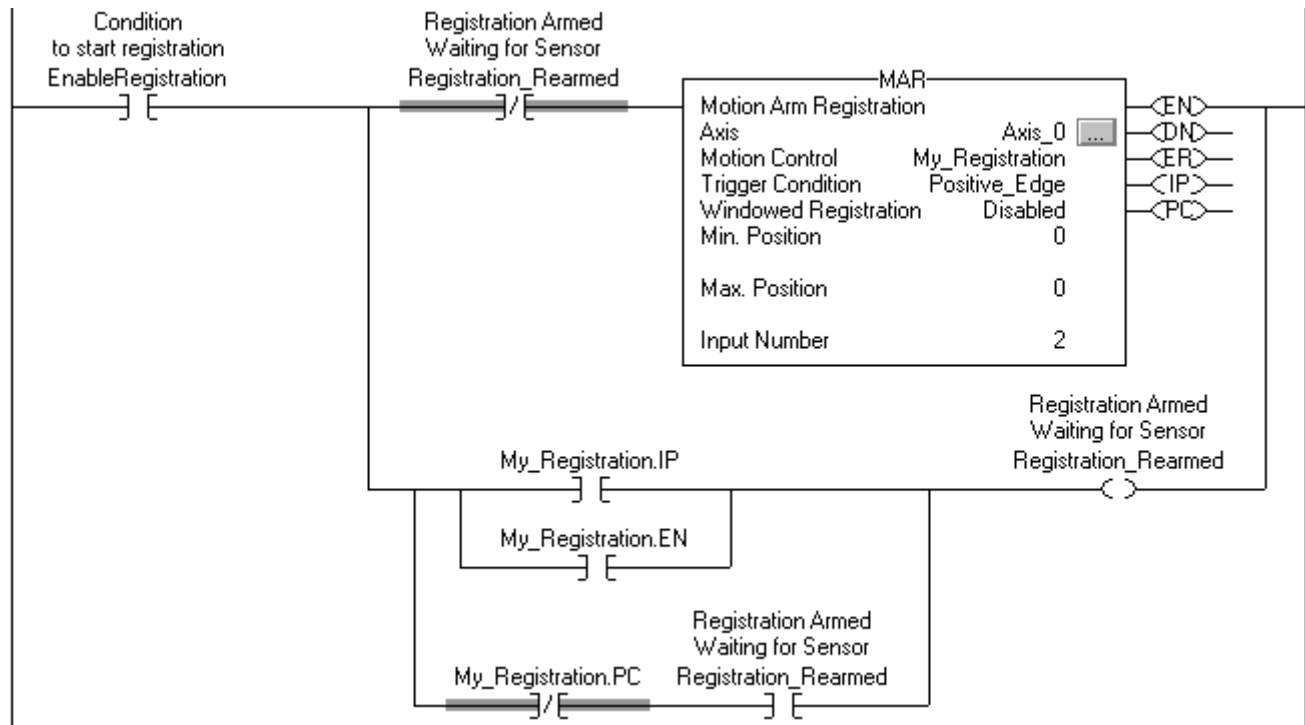
Removal of the Inhibit Operand for the MGS Instruction

The MGS instruction no longer includes an Inhibit operand. When you update your project to this revision, any MGS instructions automatically convert as follows.

If the Inhibit operand was:	The Stop Mode is set to:
Disabled	Fast Stop
Enabled	Fast Disable

Rearming an MAR Instruction

If your application requires rapid and continuous detection of a registration sensor, we recommend that you use the following logic:



To rearm the MAR instruction, the rung must change from false to true. The rate at which this logic functions depends on the following:

- program scan time
- motion task course update rate

Additional Memory Requirements

This revision requires more memory than previous revisions:

- Before you upgrade to this revision, check the amount of unused memory that you have in the controller.
- To upgrade to this revision, you may have to add an expansion memory card to the controller or use a larger memory card.

To estimate the additional memory that your project will require, use the following table:

If you have this firmware revision (add <i>all</i> that apply):	Then add the following memory requirements to your project:				
	Component		Number in your project	Increase per instance	Total (number x increase)
9.x or earlier	tag that uses the MESSAGE data type			376 bytes	
8.x or later	axis			(-21.6K bytes)	
8.x or earlier	output cam execution targets			5,404 bytes	
	motion group			32 bytes	
7.x or earlier	project			1050 bytes	1050 bytes
	tags			0.55 bytes	
	messages that: <ul style="list-style-type: none"> • transfer more than 500 bytes of data <i>and</i> • target a controller in the same chassis This memory is allocated only when the MSG instruction is enabled. To estimate, count the number of these messages that are enabled and/or cached at one time.			2000 bytes	
6.x or earlier	base tags			24 bytes	
	alias tags			16 bytes	
	produced and consumed tags	Data type	Bytes per tag		
		DINT	4	12 bytes	
		REAL	4	12 bytes	
				3 x bytes per tag	
				3 x bytes per tag	
				3 x bytes per tag	
				3 x bytes per tag	
6.x	routines			68 bytes	
5.x or earlier	routines			116 bytes	
	Total additional bytes				

For additional information on how the controller organizes its memory, see Knowledgebase document 13964. To access Rockwell Automation's Knowledgebase, go to www.ab.com. Select *Support*.

Common Corrected Anomalies

This revision of ControlLogix controllers (ControlLogix5550, ControlLogix5553, ControlLogix5555, and ControlLogix5563) corrects the following anomalies:

Deleting a Tag While Online Might Have Locked-Up Communication or Caused a Controller Failure

If you deleted an unused tag while online, either of the following failures might have occurred:

- You were unable to communicate with the controller. RSLinx showed a red X over the controller and you were unable to communicate with the controller through either the serial port or another communication module.
- The controller may have become inoperative. (The OK LED of the controller turned solid red.)

The failure could have occurred immediately after you deleted the tag or later on in the execution of the project. A power cycle would temporarily clear the problem.

Output Cam That is Attached to a Consumed Axis

If you attached an output cam to a consumed axis, the following members of the AXIS tag *did not* update:

- OutputCamStatus
- OutputCamPendingStatus
- OutputCamLockStatus
- OutputCamTransitionStatus

Indirect Addressing of an ASCII String

You *could not* download a project that used an indirect address (tag in the subscript of an array) to a string data type.

Using the Same Message Control Tag in Different Messages

If you used the same Message Control Tag for messages in different tasks, the controller may have become inoperative. (The OK LED of the controller turned solid red.)

Turning On the TO bit of a MESSAGE Structure

If you turned on the TO bit of a MESSAGE structure in your logic, the controller may have become inoperative. (The OK LED of the controller turned solid red.)

Setting the CommandRegister.Reset of Two 1756-DNB Modules

If you turned on the CommandRegister.Reset member of two 1756-DNB modules at the same time, the controller became inoperative. (The OK LED of the controller turned solid red.)

Common Restrictions

This revision of ControlLogix controllers (ControlLogix5550, ControlLogix5553, ControlLogix5555, and ControlLogix5563) has the following restrictions:

Keep the Size of the ASCII Buffer to Less than or Equal to 255 Characters

If you use ABL instructions, set the size of the ASCII buffer of the serial port to less than or equal to 255 characters. If you use a larger setting, an ABL instruction may miss the termination character and the status bits may be set to erroneous values.

Disconnect the Controller from a DH-485 Network *Before* You Update the Firmware of the Controller

If you update the firmware of a controller while it is connected to a DH-485 network, communication on the network may stop. To prevent this, disconnect the controller from the DH-485 network *before* you update the firmware of the controller.

Produce/Consume Axis Tags Only Between Controllers with Revision 10.x or Later Firmware

This revision lets you produce and consume axis tags only between controllers that have 10.x or later firmware. This includes tags of the following data types and their members:

- AXIS_CONSUMED
- AXIS_SERVO
- AXIS_VIRTUAL
- AXIS_SERVO_DRIVE

Force Values in a Large I/O Connection

In large I/O connections, force values may slow down the rate at which the controller processes repetitive motion registration and watch positions.

Setting the Value of the PositionUnwind Attribute

Currently, RSLogix 5000 software lets you use an SSV instruction to set the PositionUnwind attribute of a consumed axis (a tag with the data type of AXIS_CONSUMED). However, the value is overwritten by the producing controller when the tag is updated.

MAOC Instruction

Depending on how you configure it, an MAOC instruction may fail to change an output or outputs:

- The following parameters of the MAOC instruction compensate the cam position:
 - Position Reference (Command or Actual)
 - Offset, LatchDelay, and UnlatchDelay members of the Output Compensation array
- The instruction first applies the compensation when it is armed and the axis moves.
- If the Cam Arm Position is too close to the Cam Start or Cam End Position, the compensation may put a cam out of the range of the Cam Start Position or Cam End Position
- If a pending cam exists when a cam goes out of range, the cam transitions to the pending cam regardless of Execution Mode.
- If a pending cam does not exist when a cam goes out of range and the Execution Mode is Once, the instruction will no longer change an output. There are no adverse effects if a pending cam does not exist when a cam goes out of range and the Execution Mode is set to Continuous or Persistent.

Depending on your combination of Execution Mode, Position Reference, Output Compensation, Cam Arm Position, Cam Start or End Position, and the existence of a pending cam, the instruction may incorrectly handle some or all outputs.

For example: The following configuration could put all cams out of range:

MAOC Parameter:	Selection:
Offset, Latch Delay, Unlatch Delay Output Compensation	none
Execution Mode	Once
Cam Start Position	close to Cam Arm Position
Cam Arm Position	close to Cam Start Position
Position Reference	Command (This compensates all cams in the negative direction.)

When the instruction is armed and the axis moves, the instruction immediately completes and sets the PC bit without changing any outputs. If a pending cam exists, the instruction immediately transitions to the pending cam.

Group Overlap Fault of a Motion Group

In a motion group, a group overlap fault causes the connection to the associated motion module or modules to time-out.

- In the I/O configuration of the controller, the motion modules display warning symbols and indicate that their connections timed-out.
- Once you correct the group overlap fault, the controller re-establishes its connections to the motion modules.

Certain Axis and Module Fault Conditions Disarm Output Cams

When the controller detects one of the following faults, it disarms output cams:

- For servos and drives, axis feedback loss fault
- For servos and drives, module fault
- For consumed axis, physical axis fault

Those faults produce unreliable feedback data.

Also, if an axis fault exists when an MAOC instruction is initiated, the instruction errors.

ControlLogix5555 Corrected Anomalies

This revision of ControlLogix5555 controllers corrects the following anomalies:

Running Out of Memory Caused Communication Lock-Up or Controller Failure

This revision lets the controller remain operative and maintain some communication even when it runs out of memory.

- At runtime, the following communications require additional memory:
 - polled (OPC/DDE) tags that use RSLinx software
 - Message (MSG) instructions
- If the controller does not have enough memory, those communications receive error messages and fail to establish.

In *previous* revisions, there was a high probability that communications would stop when the controller ran out of memory. (RSLinx software showed a red X over the controller.) Also, the controller may have become inoperative. (The OK LED of the controller turned solid red.)

If your controller currently uses more than 70% of its memory at runtime, consider updating the controller to this revision or later of firmware. To determine how much memory your controller uses at runtime, see Knowledgebase document *Getting Controller Memory Properties Without Using OPC Test Client*, Tech Note ID # 9145638. To access Rockwell Automation's Knowledgebase, go to www.ab.com. Choose *Support*.

ControlLogix5555 Changes

This revision of ControlLogix5555 controllers contains the following changes:

Firmware Update Clears the Nonvolatile Memory

Once you update the firmware of a 1756-L55M22, -L55M23, or -L55M24 controller to this revision, *future* updates automatically clear the project that is in the nonvolatile memory of the controller.

- This lets you update the controller even if the project in the nonvolatile memory is set to either of the following Load Image options:
 - *On Power Up*
 - *On Corrupt Memory*
- In prior revisions, the *On Power Up* or *On Corrupt Memory* options caused a firmware update to fail.

ControlLogix5555 Restrictions

The 1756-L55M16 controller has the following restrictions:

- You *cannot* download a project that has more than 3.5M bytes of tags to a 1756-L55M16 controller. During the download, RSLogix 5000 software indicates that the controller is out of memory.

To stay within the 3.5M byte limit, take this precaution:

- As you create tags, periodically download the project. If the project successfully downloads, then you know you are within the 3.5M byte limit.
- You *cannot* download a project that has very large routines. During the download, RSLogix 5000 software indicates that the controller is out of memory. (While online, you may be able to create a very large routine, but once offline you will be unable to download the project.)

To avoid creating routines that are too large, take these precautions:

- Limit the number of rungs in a routine to less than 2500. (Use a series of smaller routines.)
- If you are entering a large number of rungs in a routine, do this offline.
- As you enter rungs, periodically download the project. If the project successfully downloads, then your routines are within limits.

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