ControlLogix 5560M03SE Combination Controller and SERCOS Interface, Firmware Revision 13

Catalog Number 1756-L60M03SE

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When to Use These Release Notes

These release notes correspond to firmware revision 13.11 of the ControlLogix 5560M03SE controller.

Cat. No.	Controller
1756-L60M03SE	ControlLogix 5560M03SE

These release notes include the enhancements and corrected anomalies of earlier revision 13 firmware.

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About the ControlLogix 5560M03SE Controller

The ControlLogix 5560M03SE controller is a two-slot ControlLogix controller that includes a three-axes SERCOS interface. The controller gives you:

- 750 k bytes of data and logic memory.
- performance similar to a ControlLogix5563 controller.
- control of up to three SERCOS interface drives via the integral SERCOS interface of the controller.
- control of up to three additional SERCOS interface drives or analog drives by adding modules to the chassis.
  - For SERCOS interface drives, use the 1756-M03SE module. Make sure each SERCOS interface module has its own ring.
  - For analog drives, use either the 1756-HYD02, 1756-M02AE, or 1756-M02AS module.
- automatic update of the SERCOS interface when you update the firmware of the controller
- nonvolatile memory storage via a 1784-CF64 Industrial CompactFlash card

When you	The 1784-CF64 industrial CompactFlash card
Store a project to nonvolatile memory	stores the firmware for both the controller and the SERCOS interface
Load a project from nonvolatile memory	updates the firmware of both the controller and the SERCOS interface, if required

For more information on the use of nonvolatile memory, see Logix5000 Controllers Common Procedures, publication 1756-PM001.

- extended battery support via a 1756-BATM battery module (recommended if you do not use a CompactFlash card)

Compatible Revisions

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

Update	To Revision
RSLinx software	2.42 or later
RSLogix 5000 software	13.00 or later
RSNetWorx for ControlNet software	4.21 or later
RSNetWorx for DeviceNet software	4.21 or later
RSNetWorx for EtherNet/IP software	4.21 or later
1756-HYD02 module	13.2 or later
1756-M02AE module	13.2 or later
1756-M02AS module	13.6 or later
1756-M03SE module	13.7 or later
1756-M08SE module	13.7 or later
1756-M16SE module	13.7 or later

Before You Begin

Before you update your controller to this revision, do the following preliminary actions.

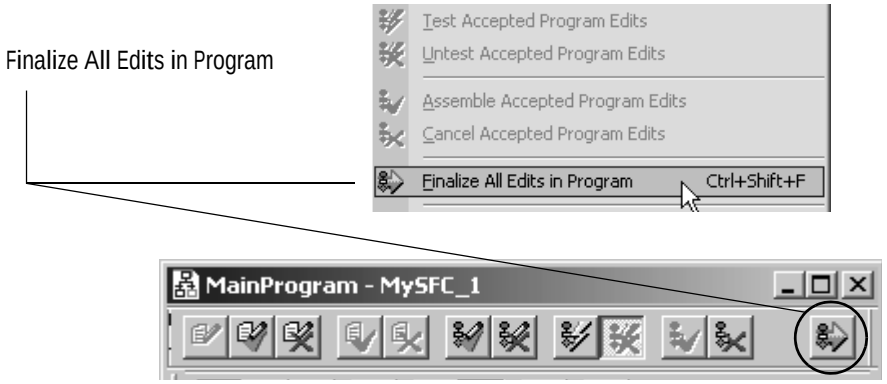
If	Then
Your controller is close to its limits of memory.	This revision may require more memory than previous revisions. • To see what components of your current project require more memory, see page 22. • RSLogix 5000 software, version 13.0 or later lets you estimate the memory requirements of the controller offline. See page 6.
Your controller is connected to a DH-485 network.	Disconnect it from the 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.

Enhancements

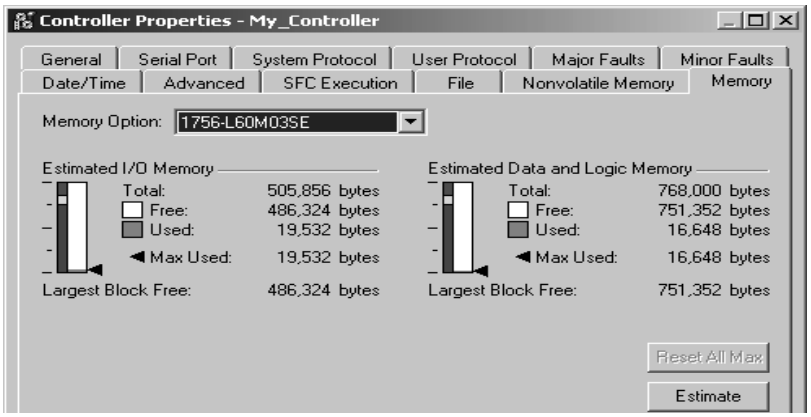
This revision of ControlLogix5560M03SE controller contains the following new features.

Firmware Revision	Enhancement	Description
13.10	SERCOS interface	The SERCOS interface of the controller contains the following enhancements when compared to 1756-M08SE and 1756-M16SE modules, revision 12.*x* and earlier: • Use RSLinx to browse for Rockwell Automation drives on a SERCOS interface link. • Eliminated repetitive SERCOS interface ring scanning when module is not in the I/O configuration of the controller. • Use Rockwell Automation drives with Auxiliary Axis capability. • Direct a drive, at configuration, to ignore its Enable Input. • Use Continuous Torque Limit control in a drive. • Use a Kinetix 6000 Resistive Brake Module. • Use a Kinetix 6000 drive Auxiliary axis, feedback-only configuration. • Use Physical Test mode to aid in troubleshooting issues with fiber-optic media integrity. See publication Fiber Optic Cable Installation and Handling Instructions, publication 2090-IN010, for more information on this topic.
13.10	Online edits of Sequential Function Charts (SFC) and Structured Text (ST)	This revision lets you perform online editing of Sequential Function Chart (SFC) and Structured Text (ST) routines. Like the Function Block Diagrams (FBD), online editing of SFC and ST routines is done at a routine level.

Firmware Revision	Enhancement	Description

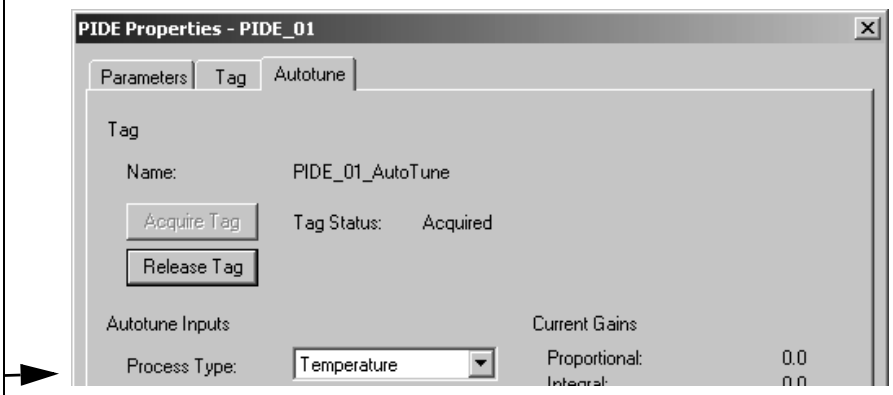
13.10	Finalize all edits in a program	The Finalize All Edits in Program option lets you make an online change to your logic **without** testing the change.
		 
		When you choose Finalize All Edits in Program:
		• all edits in the program (pending and test), immediately download to the controller and begin execution.
		• the original logic is permanently removed from the controller.
		• outputs that were in the original logic stay in their last state unless executed by the new logic (or other logic).
		• if your edits include an SFC:
		  • the SFC resets to the initial step.
		  • stored actions turn off.

13.10	Motion Calculate Slave Value (MCSV) instruction	Use the MCSV instruction in the following applications: • Position cam: electronic camming between two axes according to a specified cam profile • Time cam: electronic camming of an axis as a function of time, according to a specified cam profile The MCSV instruction returns the slave value within a specified cam profile for a given master value. The master value can be master position or time. Use that information to re-synchronize motion after a fault or to calculate dynamic phase corrections.

<table>
<tr><th>Firmware Revision</th><th>Enhancement</th><th>Description</th></tr>
<tr><td>13.10</td><td>Estimate memory information offline view memory information online</td><td>To estimate how much controller memory your project requires, use the Memory tab of the controller properties dialog. For each of the memory areas of your controller, it lets you estimate number of bytes of:
free (unused) memory.
used memory.
largest free contiguous block of memory. 

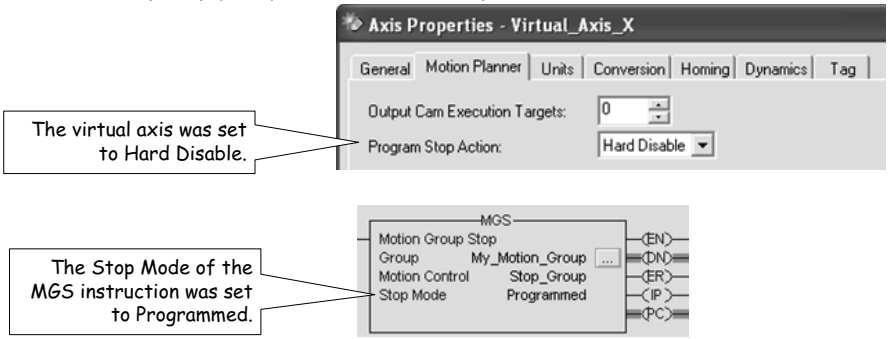
When online with a controller, the Memory tab shows the actual memory usage of the controller. The tab includes a Max Used entry for each type of memory. The Max Used values show the peak of memory usage as communication occur.</td></tr>
<tr><td>13.10</td><td>Improved performance of simple structured text statements</td><td>The controller now executes simple structured text (ST) assignments and comparisons faster than previous revisions.
<table>
<tr><th>For this</th><th>This is simple</th><th>This is NOT simple</th></tr>
<tr><td>Assignment</td><td>A := B;</td><td>A := -B;
A := B + C;
A := sin(B);</td></tr>
<tr><td>Comparison (=, <, <=, >, >=, <>)</td><td>A > B
A = B</td><td>A > -B
A > (B + C)
A > sin(B)</td></tr>
</table></td></tr>
<tr><td>13.10</td><td>Embedded EDS support</td><td>ControlLogix controllers now include their electronic data sheet (EDS) file as part of their firmware. This lets RSNetWorx software 5.x or later upload and register the EDS file directly from the controller. In previous revisions, you had to find the file on a CD or a web site and manually install the EDS file.</td></tr>
</table>

<table>
<tr><th>Firmware Revision</th><th>Enhancement</th><th>Description</th></tr>
<tr><td>13.10</td><td>For some non-recoverable faults, the controller produces a major fault and may be able to log diagnostic information</td><td>If the controller detects a non-recoverable fault that was not caused by its hardware, the controller clears the project from its memory and produces a major fault (flashing red OK LED). The fault code that it displays depends on whether you have installed a CompactFlash card in the controller.
<table>
<tr><th>Type</th><th>Code</th><th>Cause</th><th>Recovery Method</th></tr>
<tr><td>1</td><td>60</td><td>For a controller with no CompactFlash card installed, the controller:
detected a non-recoverable fault.
cleared the project from memory.</td><td>1. Clear the fault.
2. Download the project.
3. Change to remote run/run mode.
Follow these steps if the problem persists:
1. Before you cycle power to the controller, record the state of the OK and RS232 LED indicators.
2. Contact Rockwell Automation support. See the back of this publication.</td></tr>
<tr><td>1</td><td>61</td><td>For a controller with a CompactFlash card installed, the controller:
detected a non-recoverable fault.
wrote diagnostic information to the CompactFlash card.
cleared the project from memory.</td><td>1. Clear the fault.
2. Download the project.
3. Change to Remote Run/Run mode.
If the problem persists, contact Rockwell Automation support. See the back of this publication.</td></tr>
</table>
In previous revisions:
the controller would not go to faulted mode or display a fault code for the type of situation described above.
controllers with a CompactFlash socket showed a solid red OK LED.</td></tr>
<tr><td>13.5</td><td>In a Message (MSG) instruction, you cannot set or clear certain status bits</td><td>Do not set or clear the following members of a Message (MSG) instruction:
EW
ER
DN
ST
Flags
Important: If your logic currently manipulates any of the above members of a MSG instruction, your controller may operate differently when you update to this revision.
If you set or clear one of those bits, RSLogix 5000 software displays the change. But the MSG instruction ignores the change and continues to execute based on the internally-stored value of those bits.</td></tr>
</table>

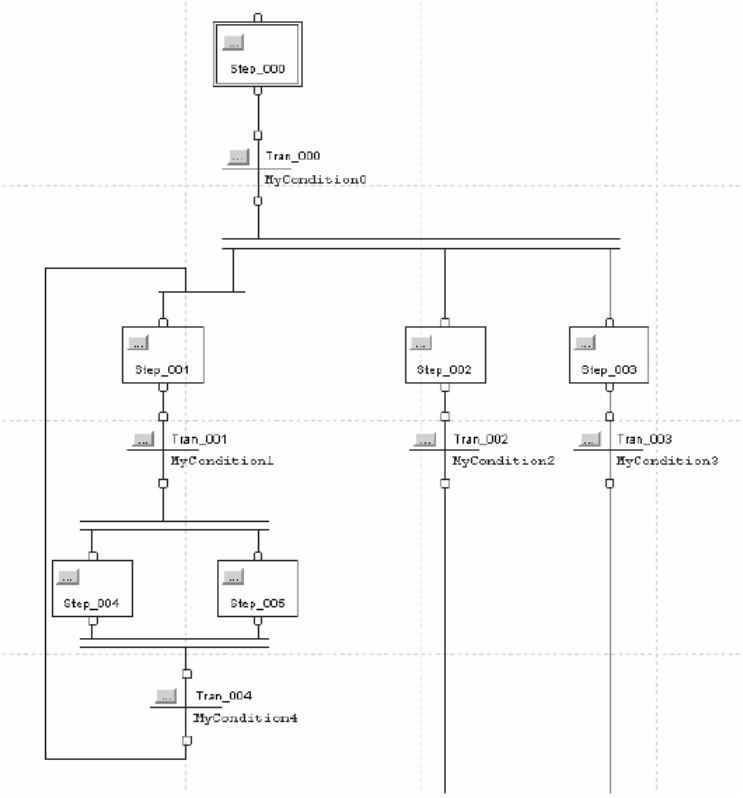
Firmware Revision	Enhancement	Description
13.5	For Function Block instructions that use periodic timing, DeltaT includes the fractional portion of the task's period	If your function block instruction uses the Periodic Timing mode, the controller no longer truncates the fractional portion of a task's period to produce the delta time (DeltaT). In previous revisions, the controller truncated the fractional portion of the task's period. Lgx00036282
13.5	Out-of-range subscript no longer produces a fault during prescan	During prescan, the controller automatically clears any faults due to an array subscript that is beyond the range of the array (out of range). In previous revisions, this produced a major fault. Lgx00040220
13.5	Autotune uses a non-integrating process model for temperature processes	When you autotune an Enhanced PID (PIDE) function block with the Process Type = Temperature, autotune now uses a non-integrating process model to estimate tuning constants. This gives better tuning constants for most application.  In previous revisions, autotune used an integrating process model. Lgx00041638
13.5	Reduction in the prescan time of projects with many Jump to Subroutine (JSR) instructions	During a prescan, the controller no longer prescans a routine more than once. Once it prescans a routine, the controller does not prescan the routine again during that prescan. In previous revisions, the controller would prescan a routine as often as it was called in logic. For projects with many calls to subroutines, this could produce a very long prescan and cause a watchdog timeout fault. Lgx00043977

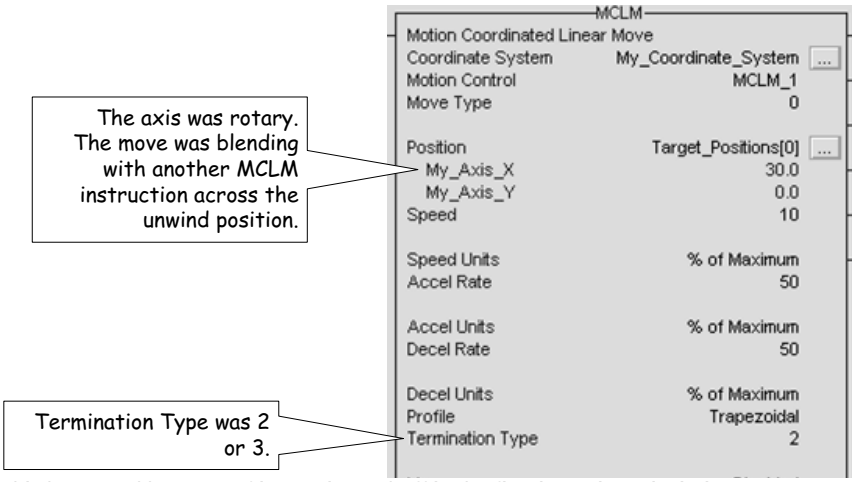
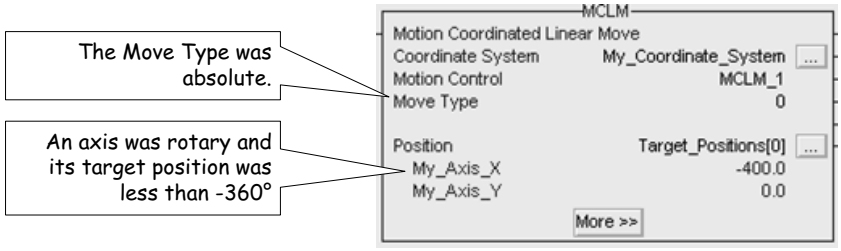
Corrected Anomalies

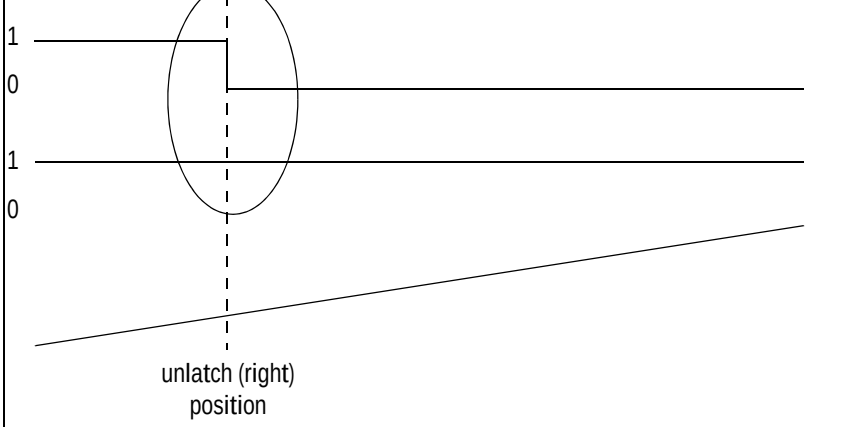
These corrected anomalies are organized by the firmware revision that corrected them.

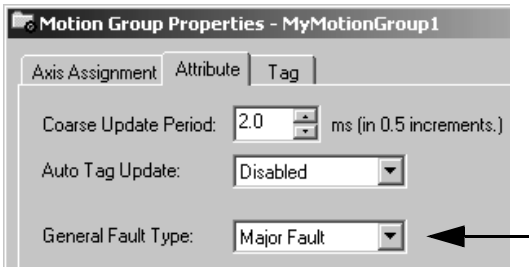
Firmware Revision	Corrected anomaly	Description
13.11	SERCON816 ASIC chip	A SERCOS interface module ring drop and service channel issue was identified as a result of an anomaly occurring in the SERCON816 ASIC chip.
13.10	Save to CompactFlash did not complete properly	Saving a project to CompactFlash did not always complete. The LEDs on the controller would continue to flash until you cycled power. Lgx00047687, Lgx00047577
13.10	GroupSynched bit did not reset after a power cycle	The GroupSynched bit of the motion group stayed on after a power cycle instead of turning off until the motion group was synchronized again.  Lgx00049320
13.10	MSG Read of user-defined structure greater than 500 bytes did not return any data	A MSG read of a user defined structure that contained more than 500 bytes should have read some data before determining that the structure was too large. Lgx00050774
13.10	MGS instruction with hard disable did not stop a virtual axis	A Motion Group Stop (MGS) instruction didn't stop a virtual axis under these conditions.  Lgx00050853
13.10	Large MSG instructions	This revision of ControlLogix firmware adds more stringent range checks when reading to or writing from tags. This could cause some MSG instructions that worked in previous firmware revisions to not work in this revision of firmware. For example, use a CIP Generic MSG instruction to perform a Get Attribute Single service. The attribute is 4 bytes in length. Assume the destination tag is an INT data type (2 bytes in length). In previous releases of firmware, the MSG instruction places the first 2 bytes of the attribute in the destination tag. In this revision of firmware, the MSG instruction errors because the destination tag is not large enough. To correct this error, change the destination tag to a DINT data type.
13.10	Large SLC-typed write MSG instructions	This revision of ControlLogix firmware limits the maximum packet size of SLC typed write MSGs to 216 bytes. Previously, these messages had a maximum size of 224 bytes. This could cause some MSG instructions that worked in previous firmware revisions to not work in this revision of firmware. Lgx00052949

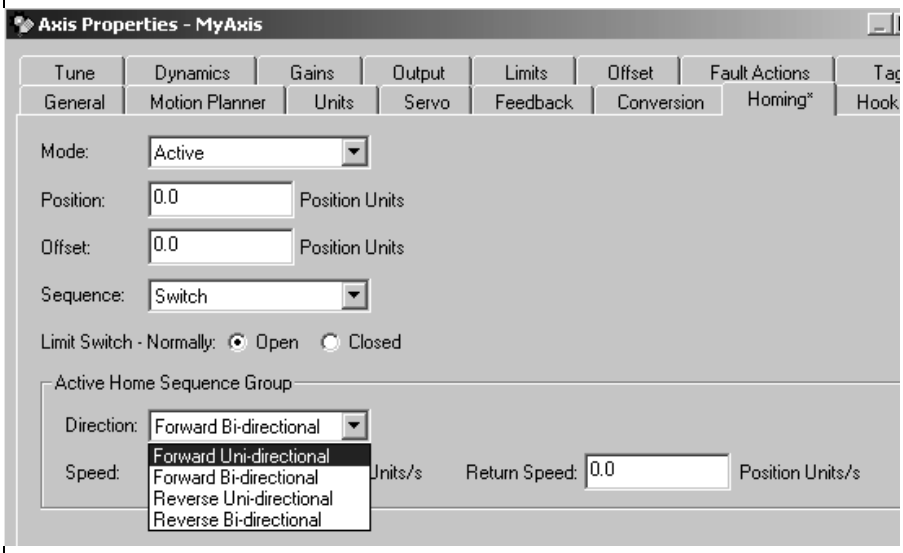
Firmware Revision	Corrected anomaly	Description
13.10	Programmatic change of MSG status bits could cause the MSG to appear remain active (.EN Set)	If you programmatically reset the .DN or .ER bits of a MSG due to the asynchronous nature of the MSG, the MSG could appear to remain active (.EN set). In fact, the MSG was not active. The MSG required manual intervention to trigger it to execute again. This firmware revision removes the need for manual intervention to trigger the MSG to execute again. Lgx00053112
13.10	Unexpected motion happened when turning on an axis	An axis moved as soon as you turned it on if you did this sequence of actions. 1. You turned off the axis with a Motion Servo Off (MSF) instruction. 2. You started another move **while the MSF was still in process**. 3. You turned the axis back on by a Motion Servo On (MSO) instruction. When this happened: • The axis started the commanded move as soon as you turned it back on by the MSO instruction. • You couldn't stop the axis with a Motion Axis Stop (MAS) instruction. This happened because the controller kept the move command that you gave it while it was turning off the axis. The controller did the move the next time you turned that axis back on. Lgx00054654

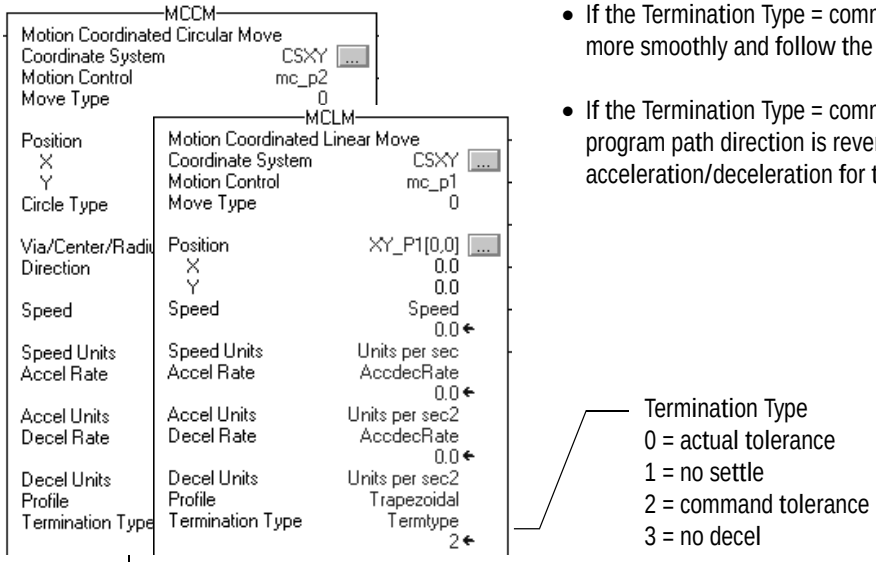
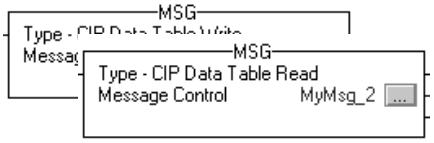
Firmware Revision	Corrected anomaly	Description
13.10	An SFC could execute the wrong step	If you had an SFC with nested simultaneous branches, the controller could begin execution at an unexpected step. Following the convergence of a nested simultaneous branch, if the SFC looped back to the initial step of the parent branch, instead of executing that step, the SFC could jump to a step of another path in the nested simultaneous branch.  Execution starts at Step_000. When Tran_000 becomes true, Step_001, Step_002 and Step_003 should become active. However, because the nested simultaneous branch in the left path converged and looped back to its parent step (Step_001), the active steps were actually **Step_005**, Step_002, and Step_003. Lgx00054785
13.10	The File Search Compare (FSC) instruction caused a non-recoverable fault	The FSC instruction caused a non-recoverable fault if both of these conditions occurred. • A major fault was declared from within the expression of an FSC instruction • The user fault routine cleared the fault When the user fault routine attempted to recover, information previously saved was not properly restored, which resulted in corrupted system registers and a non-recoverable fault. Lgx00055522
13.10	CONCAT instruction generated minor fault when the length of the data equaled the maximum characters allowed for the string	The CONCAT instruction incorrectly generated a minor fault (Type 4, Code 51) when the length of the data was equal to the maximum number of characters allowed for the string data type. Lgx00056558

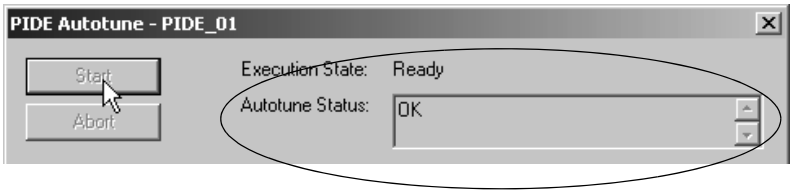
Firmware Revision	Corrected anomaly	Description
13.10	MCLM instruction sometimes caused an extra revolution when an axis was near its unwind position	Sometimes a Motion Coordinated Linear Move (MCLM) instruction moved an axis an extra revolution under these conditions.  This happened because of internal round-off in the floating point calculations. Lgx00057176
13.10	MCLM instruction did not error with a target position less than -360°	A Motion Coordinated Linear Move (MCLM) instruction did not error under these conditions.  Lgx00057179

Firmware Revision	Corrected anomaly	Description
13.8	MAOC instruction left output bit on when enable bit turned off	Under the following conditions, the Motion Arm Output Cam (MAOC) instruction left the output bit on when the bit should've turned off. • Unlatch type = Position and Enable • The enable bit turned off at the same time the position passed through the unlatch (right) position. 
13.7	Certain conditions could generate an unknown major fault when a motion axis fault occurred	Under these conditions, RSLogix 5000 software displayed an unknown major fault after an axis fault occurred: • UID/UIE instruction in an event, periodic, or continuous task • The motion group is configured to trigger major faults in response to axis faults • Fault handler routine responds to axis faults and clears the axis fault code • An axis fault occurs while the user task is in the UID section of code Lgx00046070
13.7	Loss of UID/UIE behavior if a fault routine executed	The controller uses an internal count to keep track of nesting UID/UIE instructions. When a UID is scanned, the count increments by one; when a UIE is scanned, the count decrements by one. The count is set to zero when a program completes execution. If a fault routine executed when the UID/UIE count was not zero, at the end of the fault routine, the controller set the UID/UIE count back to zero. Control was returned to the program with interrupts enabled when they should still be disabled. Lgx00046070
13.7	Memory allocations for HMI OPC applications were made in I/O memory rather than data and logic Memory	For HMI OPC applications, memory normally allocated to Data and Logic memory was being allocated to I/O memory. This could cause the controller to run out of I/O memory where in previous versions it did not. This could also cause messaging and other HMI OPC applications to not respond or time out. This did not affect I/O based connections. Lgx00047148

Firmware Revision	Corrected anomaly	Description
13.7	Backplane errors caused loss of input data	Errors that occur for certain backplane-noise conditions caused the data being received by the controller to stop flowing into the data table of the controller. The controller did not detect when this happened and the connection status and I/O LED indicators still indicated that everything was working. Lgx00047199
13.7	Subroutines invoked from SFC actions were not properly postscanned	A subroutine invoked from an SFC action was not properly postscanned when the SFC was configured for automatic reset. Instructions and assignments may not have set their data to postscan values. For example, an Output Energize (OTE) instruction may not have cleared its data during postscan. Lgx00047407
13.7	In SFCs configured for Auto Reset, stored actions were not properly postscanned	When an SFC was configured for Automatic Reset and an Action used a stored qualifier (S, SD, SL, DS), when a reset action (R) executed, the action being reset was not postscanned. Lgx00047935
13.5	Motion Planner no longer waits for consumed data to start flowing	The motion planner now begins execution immediately, regardless of whether or not it is receiving data via a consumed axis. In previous revisions, a consumed axis caused the motion planner to delay its execution until data started flowing from the producing controller. Under the following **combination** of circumstances, the motion task of the controller failed to start at all: • The system included 2 ControlLogix controllers in the same chassis. • Each controller produced an axis for the other controller. Lgx00031365
13.5	While in Program mode, a Motion Group Fault no longer produces a Major Fault	As an option, you can configure a motion group to produce a **major fault** any time the group detects a motion fault.  With this revision, a motion group that is configured to produce a major fault produces a major fault **only** if the controller is in Run/Remote Run mode. In previous revisions, the motion group could produce a major fault while the controller was in Program/Remote Program mode. For example, a store to nonvolatile memory interrupts the execution of the motion planner, which produces a fault. Lgx00036957

Firmware Revision	Corrected anomaly	Description
13.5	SERCOS interface	The SERCOS interface of the controller corrects the following anomalies that were in 1756-M08SE and 1756-M16SE modules, revision 12.x or earlier: • Duplicate Node error reporting operational when error is reported by SERCOS drives Verify that all drives on the SERCOS interface link support this functionality. The error can be viewed when on-line with RSLogix 5000 software by opening the module's Module Properties dialog, SERCOS interface Info tab, and repeatedly clicking Refresh to capture the error. • Corrected the anomaly with Real Time Axis Information support of Accel. Feedback attribute. The attribute was not recognized and caused the module to fail configuration.
13.5	Uni-directional homing failed to complete	A Motion Axis Home (MAH) instruction sometimes failed to complete (IP bit remained on) under the following axis configuration: • Return Speed = 0 • Uni-directional homing (forward or reverse)  Lgx00032632
13.5	Unconditional MDR instruction did not re-execute	A Motion Disarm Registration (MDR) instruction failed to repeatedly execute under the following circumstances: • You placed the MDR instruction in a structured text routine. • You did not provide any conditions to control the execution of the instruction. (That is, you programmed it to execute continuously.) In those circumstances, the EN bit might have been left on after the first execution and the instruction no longer executed again. **Important**: In structured text, we recommend that you condition the instruction so that it only executes on a transition. Lgx00037634

Firmware Revision	Corrected anomaly	Description
13.5	Blended moves produce smoother, more accurate motion	This revision improves the response of the axes when you blend the execution of Motion Coordinated Linear Move (MCLM) and Motion Coordinated Circular Move (MCCM) instructions.  • If the Termination Type = command tolerance (2) or no decel (3), axes change more smoothly and follow the intended path more closely. • If the Termination Type = command tolerance (2) or no decel (3) and the program path direction is reversed, the instruction will exceed the specified acceleration/deceleration for the MCLM or MCCM instruction. Lgx00038048, Lgx0004146
13.5	Large Message (MSG) instructions might have caused a non-recoverable Fault	The following configuration of a Message (MSG) instruction might have produced a non-recoverable fault:  • Message type = CIP Data Table Read or Write. • The instruction transferred > 240 bytes. • Communication was through the serial port. When the controller experiences a non-recoverable fault, it clears the project from memory. Lgx00040892
13.5	During power up, the controller erroneously showed a red I/O LED indicator	During power up, the controller sometimes showed a flashing red I/O LED indicator when there was **no** problem. Lgx00040151

Firmware Revision	Corrected anomaly	Description
13.5	Autotune produced unnecessary warnings	When you completed an autotune of an Enhanced PID (PIDE) function block instruction, the autotune status field sometimes showed warning messages that were incorrect (did not apply).  Lgx00041613
13.5	Ramp/Soak (RMPS) instruction failed to initialize to the correct mode	On download, a Ramp/Soak (RMPS) instruction now initializes to Operator Manual mode unless some other mode is requested. In previous revisions, the instruction failed to initialize to the correct mode. This lack of initialization could have caused the RMPS instruction to ignore the soak time for the first ramp/soak segment. Lgx00043665
13.5	Remote output module momentarily dropped Its connection	The following combination of circumstances occasionally caused an output module to drop its connection to the controller and then re-establish the connection: • The module was in a remote chassis. • The module used a **Rack Optimization** communication format. • The controller also executed a Message (MSG) instruction that bridged across the backplane of that same remote chassis to another communication module. Occurred most frequently if the MSG instruction was **not** cached. Lgx00043674
13.5	Non-recoverable fault occurred when motion speed set to zero	A non-recoverable fault occurred on some motion moves when the speed was set to zero. This occurred because planning calculations divided by 0. Lgx00045079

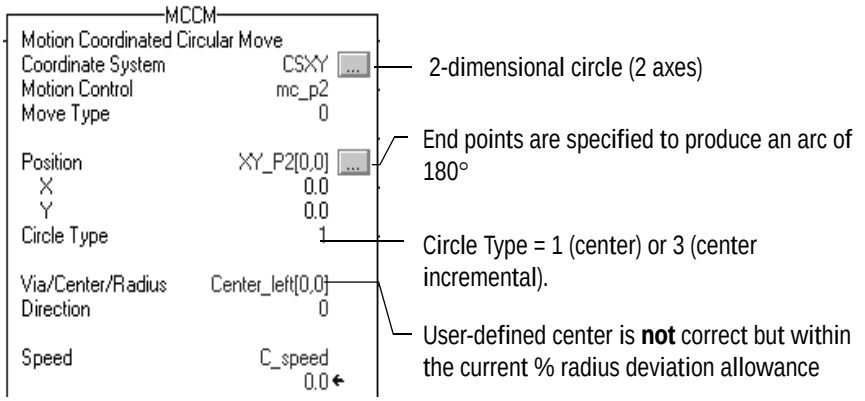
Restrictions

This revision of the ControlLogix5560M03SE controller has the following restrictions.

ATTENTION

Make sure that each axis on a SERCOS ring uses a unique SERCOS node number. If 2 axes have the same node number on the same ring, both respond to commanded motion. This could damage equipment or injure people.

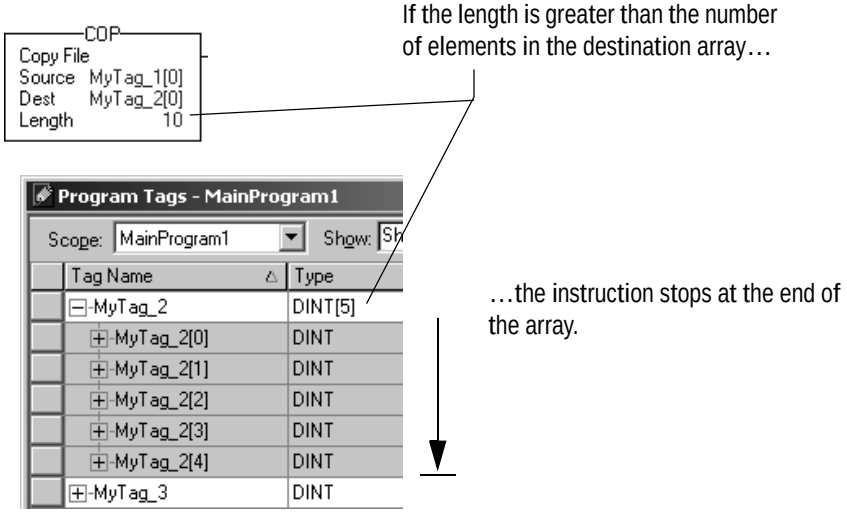
Restriction	Description
Unexpected motion can happen when you home a rotary axis of a SERCOS drive	A rotary axis of a SERCOS drive can move with unexpected motion if you use a Homing Offset when you home the axis. The axis starts to move at a high speed until a position error fault happens. Once the fault happens, the axis responds with the configured fault action. For example, the default fault action is Disable Drive. In that case, the controller disables the axes and the drive stops the axis. This issue happens under this specific combination of circumstances: • The type of axis is AXIS_SERVO_DRIVE (SERCOS interface drive), and • The Positioning mode of the axis is Rotary, and • The axis has a **Homing** Offset that is near or greater than the Position Unwind value of the axis, and • A Motion Axis Home (MAH) instruction executes when the axis is near its unwind position. To avoid this issue, use this sequence to home a rotary axis and move it to an offset position. 1. Set the Homing Offset of the axis to 0. 2. Use an MAH instruction to home the axis. 3. Use a Motion Axis Move (MAM) instruction to move the axis to the offset position. 4. Use a Motion Redefine Position (MRP) instruction to set the axis position to the home position. For more information, see Technote 34404. Lgx00062540
In coordinated motion a rotary axis always moves	When there is a rotary axis configured for the Coordinate System, the rotary axis makes one complete revolution even if the current command position is equal to the position in the Motion Coordinated Linear Move (MCLM) instruction. Lgx00057177

Restriction	Description
Unable to change the configuration of a 1756 discrete I/O module when used in a rack optimized connection.	Attempting to edit the configuration parameters of a 1756 discrete I/O module in a rack optimized connection using RSLogix 5000 software or an I/O reconfigure message instruction, results in a parameter error in the configuration data. The edits are not communicated to module. To edit configuration parameters for an I/O module: 1. Inhibit communication to the I/O module. 2. Make the configuration edits. 3. Un-inhibit connection to the I/O module. Lgx00060336
Moving a full circle using the MCCM instruction	To move a full circle in a two-axis coordinate system, set the Direction operand of the Motion Coordinate Circular Move (MCCM) instruction to either: • 2 (CWF - Clockwise Full) • 3 (CCWF - Counterclockwise Full) Don't try to move a full circle by setting Direction = 0 (CW) or 1 (CCW) and setting the start and end points equal or nearly equal. This may give you a small arc of nearly 0° instead of a full circle of nearly 360°. This happens because of internal round-off in the floating point calculations. Lgx00057178
In Circular Center Programming Mode, a Motion Coordinated Circular Move (MCCM) instruction may fail to reach the specified end point of a 180° arc if the circle center is miss-programmed	If you configure a Motion Coordinated Circular Move (MCCM) instruction as shown below, the instruction may not produce a move to the specified end points.  To work around this restriction, enter the correct circle center. Lgx00044813

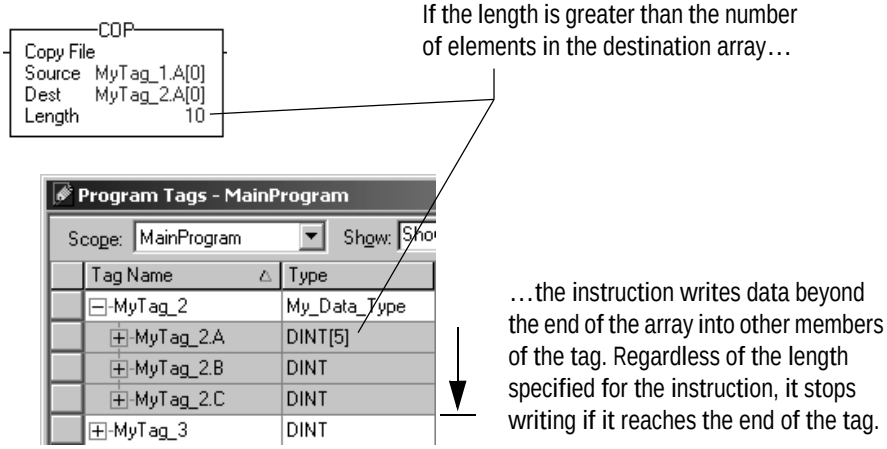
Restriction	Description
You **must** place a Label (LBL) instruction at the start of a rung	If your logic includes a Label (LBL) instruction, make sure the instruction is the first instruction on the rung. If it is **not**, move the LBL instruction to the beginning of the rung. Otherwise, the routine will not verify. In previous revisions, RSLogix 5000 software let you place the LBL instruction elsewhere on the rung. But the controller always executed the instruction as if it were at the beginning of the rung.

Restriction	Description
In a Tag of a user-defined data type, an instruction may write past the end of an array	If you write too much data to an array that is within a user-defined data type, some instructions write beyond the array and into other members of the tag.

Example 1: Instruction stops at the end of the array



Example 2: Instruction writes beyond the array



The following instructions write beyond the array into other members of the tag:

BSL	FBC	LFL
BSR	FFL	LFU
COP	FFU	SQL
CPS	FLL	SRT
DDT	GSV	SSV

To prevent writing beyond the limits of the destination array, make sure the length operand of the instruction is less than or equal to the number of elements in the array.

Lgx00033747

Additional Memory Requirements

Firmware revisions 13.0 or later may require more memory than previous revisions (for example, 10.*x*, 11.*x*). To estimate the additional memory that your project may require, use the following table:

Table 1 Additional memory requirements when you convert a project to revision 13 (Sheet 1 of 2)

If you have this firmware (add ***all*** that apply):	Then add the following memory requirements to your project			Which comes from this type of memory	
	Component		**Increase per instance**	**I/O (base)**	**Data and Logic (expansion)**
12.*x* or earlier	I/O module with a comm format = Rack Optimization		90 bytes		✔
	I/O module with a comm format = something other than Rack Optimization (that is, direct connection)		144 bytes		✔
	CompactLogix 1769 I/O module		170 bytes		✔
	Bridge module with a comm format = None		160 bytes		✔
	Bridge module with a comm format = Rack Optimization		220 bytes		✔
11.*x* or earlier	Tag that uses the MOTION_INSTRUCTION data type		4 bytes		✔
	Tag for an axis				
	If the data type is	**And the tag is**			
	AXIS_CONSUMED	⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒	264 bytes	✔	
	AXIS_SERVO	produced for another controller	264 bytes	✔	
		not produced for another controller	264 bytes		✔
	AXIS_SERVO_DRIVE	produced for another controller	288 bytes	✔	
		not produced for another controller	288 bytes		✔
	AXIS_VIRTUAL	produced for another controller	264 bytes	✔	
		not produced for another controller	264 bytes		✔
	Output cam execution targets		648 bytes		✔
	User-defined data type: • number of user-defined data types in the controller organizer ⇒ Data Types folder ⇒ User-Defined folder • **not** the use of that data type in tags		128 bytes		✔
	Indirect address (using a tag as the subscript for an array in an instruction, e.g., Array_A[Tag_B]). This memory change applies *only* if the array: • uses a structure as its data type. • does *not* use one of these data types: CONTROL, COUNTER, PID, or TIMER. • has only one dimension (e.g., UDT_1[5]).		(-60 bytes)		✔

Table 1 Additional memory requirements when you convert a project to revision 13 (Sheet 2 of 2)

If you have this firmware (add *all* that apply):	Then add the following memory requirements to your project				Which comes from this type of memory	
	Component			Increase per instance	I/O (base)	Data and Logic (expansion)
10.*x* or earlier	project for a ControlLogix5555 controller			1200 bytes		✔
	project for a ControlLogix5563 controller			1200 bytes	✔	
	programs			12 bytes		✔
	routines			16 bytes		✔
9.*x* or earlier	project for a ControlLogix5550 controller			1200 bytes	✔	
	tag that uses the MESSAGE data type			376 bytes		✔
8.*x* or 9.*x*	produced or consumed axis			-21.6 k bytes	✔	
	axis that is not produced or consumed			-21.6 k bytes		✔
8.*x* or earlier	output cam execution targets			5,404 bytes		✔
	motion group			32 bytes		✔
7.*x* or earlier	project			1050 bytes	✔	
	tags			0.55 bytes		✔
	messages that: • transfer more than 500 bytes of data and • 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	✔	
6.*x*	routines			68 bytes		✔
5.*x* or earlier	routines			116 bytes		✔

Additional Resources

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

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://support.rockwellautomation.com, 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://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running.

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell 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, it may need to be returned.

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

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