CompactLogix Controllers, Revision 16

Catalog Numbers 1769-L31, 1769-L32C, 1769-L32E, 1769-L35CR, 1769-L35E

IMPORTANT Before updating your controller, we strongly recommend that you review information pertinent to previous major firmware revisions. For example, when updating from revision 15.*x* to 16.*x*, view information for revision 15 in the ControlLogix Controllers, Revision 15 Release Notes, publication 1769-RN015, in addition to the content of these release notes.

Firmware release notes contain material for all minor revisions subsequent to each major revision. If your controller, for example, is at revision 15.3, and not the last minor revision, 15.5, you should view all of the information for revision 15.3...15.5 before updating to revision 16.*x*.

CompactLogix Controllers, Revision 15 Release Notes, publication 1769-RN015, are available at http://rockwellautomation.com/literature.

About This Publication

This publication describes enhancements and anomalies (known and corrected) for CompactLogix controllers, revision 16.

Information that has been added or changed since the last revision of this publication is indicated by a change bar as shown to the right of this paragraph.

In addition to information specific to the most recent firmware revision, the information from previous minor revisions is retained in these release notes.

We strongly recommend that you review the information provided regarding previous firmware revisions. We recommend that you do so because, if you are upgrading your firmware through multiple previous revisions, all of the information specific to all of the revisions is applicable.

For example, if you need to upgrade your controller from revision 16.03 to 16.22, all of the information specific to revisions 16.03, 16.04, 16.20, 16.21, and 16.22 is applicable.

These release notes, 1769-RN016**E**, are specific to firmware revision 16.22 for all CompactLogix controllers.

The previous revisions of this publication included the following controllers and firmware revisions. The information from previous minor revisions is retained in these release notes.

Previous Publications and Firmware Revisions

Publication No.	Catalog No.	Major and Minor Revision No.
1769-RN016D	1769-L31, 1769-L32C, 1769-L32E, 1769-L35CR, 1769-L35E	16.21
1769-RN016C	1769-L31, 1769-L32C, 1769-L32E, 1769-L35CR, 1769-L35E	16.20
1769-RN016B	1769-L31, 1769-L32C, 1769-L32E, 1769-L35CR, 1769-L35E	16.04
1769-RN016A	1769-L31, 1769-L32C, 1769-L32E, 1769-L35CR, 1769-L35E	16.03

Compatible Versions of Software

To use this controller revision, the following minimum software versions are required.

Software	Required Version
RSLinx Classic RSLinx Enterprise	2.51 4.00
RSLogix 5000	16.00(1)
RSNetWorx for ControlNet	8.00
RSNetWorx for DeviceNet	
RSNetWorx for EtherNet/IP	

(1) Note that firmware revision 16.21, or later, is compatible with RSLogix 5000 software, version 16.00. However, with firmware revisions 16.21 and 16.22, the corrected anomalies and enhancements described in these release notes are available only when RSLogix 5000 software, version 16.03 or later is used.

Before You Begin

Before you upgrade your firmware, please consider the following.

IMPORTANT Loss of communication or power during a controller firmware flash upgrade may result in the controller's rejection of the new firmware. If the controller firmware upgrade fails due to the conditions described, the following corrective actions may be required:

- Cycle controller power and successfully complete the flash upgrade.
- Return the controller for factory repair if a nonrecoverable fault occurs.

The following preliminary actions are required before upgrading your controller firmware.

If	Then
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.
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 23. • RSLogix 5000 software, version 13.0 or later, lets you estimate the memory requirements of the controller offline. To update to this revision, you may have to upgrade to a controller that has more memory.

If	Then
You are attempting to upgrade the firmware on a 1769-L32E or 1769-L35E controller to revision 16.*x*	We recommend that you complete the following tasks before attempting a controller firmware upgrade: • First, check the status of the MS (module status) status indicator next to the Ethernet port. If it is flashing red before you begin the upgrade, additional action may be required. Contact Rockwell Automation Technical Support for more information. • Modify the Port Configuration for the Ethernet card so that the Network Configuration Type is set to Static and assign a valid IP address. • If RSWho is actively browsing the controller through an Ethernet or serial connection, close the RSWho window to stop the browse. • If other controllers are messaging to the 1769-L32E or 1769-L35E controller, take the other controllers off the network, or put them in Program mode. • If there are controllers consuming tags from the 1769-L32E or 1769-L35E controller, remove them from the network. • If there are HMI devices connected to the controller, disconnect them from the network or shut them down. **IMPORTANT** If you cannot perform the tasks listed above before attempting a controller firmware upgrade, Ethernet traffic on the controller's Ethernet port may cause the ControlFlash utility to timeout during the firmware upgrade. If the timeout condition is not handled properly, you may render the Ethernet port on the controller inoperable, requiring you to return the controller to Rockwell Automation for repair. In the event that a ControlFlash timeout occurs, the software displays an error dialog indicating that the "Target Device failed to report the new revision number," or that the upgrade "Failed to begin update to the target device." If the error dialogs display, check the MS status indicator. If the indicator is flashing red, the upgrade is still in progress and should not be interrupted. **Do not** cycle power to the controller while the status indicator is flashing red. If the upgrade completes, the controller power cycles itself and indicates the upgrade is complete with a solid green MS status indicator. The time required to complete the upgrade is dependent on the level of Ethernet traffic. If the controller does not complete the upgrade, the MS status indicator continues flashing red. In this case, contact Rockwell Automation Services and Support.

Enhancements

This enhancement is provided with revision 16.22.

Firmware Revision	Enhancement	Description
16.22	False Execution Time of Add-On Instructions Improved	With previous revisions, the false execution time of an Add-On Instruction was dependent on the number of parameters (input, output, and inout) configured for the instruction. The more parameters configured, the longer the false execution time of the Add-On Instruction. With this revision, the false execution time of an Add-On Instruction is now constant if a scan false routine is not created. To determine the false execution time of Add-On Instructions based on your controller, reference the values published in the Logix5000 Controllers Execution Time and Memory Use Reference Manual, publication 1756-RM087. Lgx00106477

These enhancements have been made in previous firmware revisions.

Enhancements Provided with Previous Firmware Revisions

Firmware Revision	Enhancement	Description
16.20	Radio Modem Protocol Support	With this revision, the DF1 Radio Modem protocol, already supported by SLC 500 and MicroLogix products, has been implemented and enabled in the ControlLogix, CompactLogix, FlexLogix, and DriveLogix controllers. Legacy and Logix5000 controllers can be mixed and can support both master and slave and store and forward configurations.
16.03	Add-On Instructions	With version 16 of RSLogix 5000 programming software, you can design and configure sets of commonly used instructions to increase project consistency. Similar to the built-in instructions contained in Logix5000 controllers, these instructions you create are called Add-On Instructions. Add-On Instructions reuse common control algorithms. With Add-On Instructions, you can: • ease maintenance by animating logic for a single instance. • protect intellectual property with password-protected instructions. • reduce documentation development time. For more information about using Add-On Instructions, see the Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001.
	Logix5000 Firmware Supervisor	Use of the Logix5000 Firmware Supervisor with ControlLogix controllers and certain I/O modules enables you to program the controller to complete firmware updates by using a GSV or SSV instruction. The controller uses a firmware kit loaded on a CompactFlash card and can complete firmware updates in Program and Run modes. In GuardLogix controllers, this enhancement is available for use with standard I/O modules.
	FactoryTalk Alarms and Events Features	Alarms are now embedded in the controller with two new instructions, ALMD and ALMA, available in RSLogix 5000 software. These digital and analog alarm instructions are fully self-contained.

Enhancements Provided with Previous Firmware Revisions

Firmware Revision	Enhancement	Description
16.03	Ability to Unicast Producer/Consumer Tags on EtherNet/IP Networks	Revision 16 enables you to use RSLogix 5000 software to set Producer and Consumer tag connections to Unicast. Setting the tags to Unicast decreases the network bandwidth and simplifies Ethernet switch configuration.
	Logix Date Base Changed to be January 1, 1970	The Logix real-time clock operates as a 64-bit binary number that counts microseconds from a fixed date. Prior to revision 16, the base date was January 1, 1972. Recent developments with the Common Industrial Protocol (CIP) specification have resulted in the selection of a different base date of January 1, 1970 by the Open DeviceNet Vendors Association (ODVA). With revision 16, the date base that Logix products use has been changed to bring it into alignment with the CIP specification. Additionally, in support of the changes to the real time clock, several other GSV attributes were also added: LocalDateTime, TimeZoneString, ApplyDST (daylight savings time), and DSTAdjustment. Generally, the date and time were accessed via the GSV instruction within a Logix program by using the "DateTime" attribute, which breaks down the date and time to its various components (µsec, sec, min, hour, day, month, year). Applications that use this attribute of the real time clock should not be impacted by this change. However, the time was also available in its 64-bit form by using the "CurrentValue" GSV attribute. A GSV to "CurrentValue" of wall clock was changed to the number of microseconds from the new base date. Any applications that interpreted the old 1972 64-bit number may now require a change.

Enhancements Provided with Previous Firmware Revisions

Firmware Revision	Enhancement	Description
16.03	EtherNet/IP Reduced Heartbeat	The Reduced Heartbeat feature reduces the rate at which heartbeat packets are sent from a device in an I/O connection or a Produced/Consumed connection. This feature preserves bandwidth in EtherNet/IP network installations. The change is automatic and requires no selection. You will notice a reduction in the packets per second used on your EtherNet/IP network for several cases including all input modules and Produce/Consume tags. **IMPORTANT** If you upgrade your Logix controller's firmware to revision 16.*x*, you must also upgrade these adapters' firmware revisions to 2.003: • 1734-AENT, POINT I/O EtherNet/IP adapter • 1738-AENT, ArmorPoint I/O EtherNet/IP adapter Failure to upgrade your EtherNet/IP adapter firmware may impact your application if more than one Logix controller is connected to POINT I/O or ArmorPoint I/O modules. For more information on using the 1734-AENT or 1738-AENT adapters with Logix controllers that have been upgraded to firmware revision 16.*x* or later, see: • POINT I/O EtherNet/IP Adapter Release Notes, publication 1734-RN002. • ArmorPoint I/O Release Notes, publication 1738-RN002.
	System Overhead Time Slice	The System Overhead Time Slice (SOTS) lets you reserve a percentage of the controller processing resources for the handling of communication. Prior to this release, any unused part of the SOTS was used by the controller to resume the continuous task. This firmware revision lets you configure the unused portion of SOTS to either: • run the continuous task (default/legacy mode), allowing for faster execution of application code. • reserve it for communication, providing for more predictable and deterministic continuous task scan time. This enhancement allows the full impact of communication on the continuous task to be determined if time reserved for communication were always fully used.

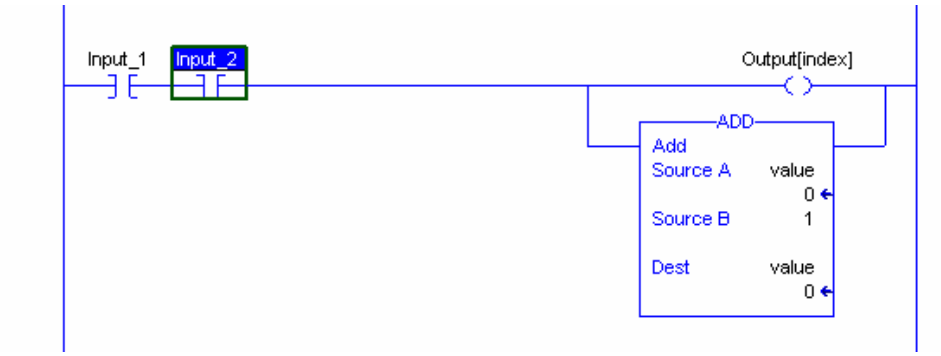
Corrected Anomalies

These anomalies have been corrected in controller firmware revision 16.22.

Anomalies Corrected With Firmware Revision 16.22

Firmware Revision	Description
16.22	A Digital Alarm (ALMD) configured to trigger when the input condition of the alarm is false does not trigger if the alarm condition is false when you conduct a download or return to Run mode. When the Condition parameter of the ALMD instruction is not set (that is, Input = 0) **and** either the program has recently been downloaded to the controller, or the controller has been changed from Run to Program and back to Run mode, the alarm is not activated (that is, the InAlarm bit is not set). These behaviors may result, depending on your application: • Programming designed to respond to the activated alarm is not executed. • Messages designed to be indicated at the operator station in response to the activated alarm are not indicated. • The alarm's history log does not indicate that the alarm was activated. If you choose not to upgrade to this revision, you must toggle the Condition parameter from set (that is, Input = 1) to not set (that is, Input = 0) to activate the alarm. If your Condition parameter is set, then the alarm activates as expected after you download or change the controller mode. Lgx000104434

Anomalies Corrected With Firmware Revision 16.22

Firmware Revision	Description
16.22	Fault handlers can be defined at the controller and program scope levels. These fault handlers are typically used to handle major recoverable faults that can occur during runtime execution of an application due to programming errors. A typical example of this would be handling indirect addressing that has gone out of range; MyTag[`index`], where `index` is larger than the size of the array. Faults can also be handled by the controller during pre-scan of the controller program on the transition to Run mode. Again, for example, the handling of indirect addressing that has gone out of range. There is an anomaly when these methods attempt to handle a fault. These are the possible ways the anomaly can manifest itself: • The controller will experience a major non-recoverable fault. I/O goes to their configured safe state, and the user application is cleared from memory. At this point, a Code 1 Type 60 or 61 major recoverable fault will be logged in the controller. This requires you to redownload the application. • Tag data corruption. • Online saving or uploading failures. • Anomalous program execution. For example, if a rung is being scanned false and there is an instruction that has false execution, the fault handler executes so the remainder of the rung will scan true. In the example below, the OTE instruction has an index out of range. After returning from the fault handler, the ADD instruction will execute, even though the rung input conditions are false.  Lgx00106481, Lgx00107423, Lgx00100766, Lgx00106478

The following table contains descriptions of anomalies corrected in previous firmware revisions.

Anomalies Corrected in Previous Firmware Revisions

Firmware Revision	Anomaly	Description
16.21	Online edits result in major non-recoverable faults (MNRFs).	Causes of this anomaly include: • a controller that was or is near its limits in memory. • doing many online edits (tag additions and deletions) without downloading again. • using RSLinx Enterprise software (CPR9). When this anomaly occurs, the controller generates a major non-recoverable fault during an online edit (tag additions and deletions). I/O goes to their configured safe state, and the user application is cleared from memory. At this point, a Code 1 Type 60 or 61 major fault will be logged in the controller. This requires you to download the application again. When online edits are made to a controller, RSLinx Enterprise software (CPR9) monitors them. When a large number of edits are made to a controller, RSLinx Enterprise software (CPR9) re-optimizes communication to the controller. Two anomalies in RSLinx Enterprise software (CPR9) are aggravating factors to this controller anomaly: • The algorithm used to determine if communication re-optimization is needed causes communication re-optimization to occur too often. • When the communication re-optimizations occur, the connections to the controller should close. However, these connections do not close. This causes the controller to orphan all information related tags on scan by RSLinx Enterprise software (CPR9). You must upgrade your controller firmware and apply RSLinx Enterprise patches. The RSLinx Enterprise patches reduce the likelihood of the controller faulting and remove the excessive memory consumption. The firmware upgrade eliminates the controller major non-recoverable faults caused by this anomaly. These RSLinx Enterprise patches are on the Rockwell Automation Knowledgebase, http://www.rockwellautomation.com/knowledgebase: • RSLinx Enterprise software version 5.00 CPR9, ID number 65818 • RSLinx Enterprise software version 5.17 CPR9 SR1, ID number 65819 • RSLinx Enterprise software version 5.20 CPR9 SR2, ID number 65820 Lgx00106378, Lgx0075608

Anomalies Corrected in Previous Firmware Revisions

Firmware Revision	Anomaly	Description
16.21	Continuous task continues to be scanned in Program mode.	After the Logix controller has been placed into Program mode after being in Run mode (either by using the key switch or by using the RSLogix 5000 software menus), the Continuous Task may continue to be scanned as though it were still in Run mode. This issue occurs only when the System Overhead Time Slice is set to Reserve for System Tasks, eg Communications. This issue is more likely to occur when the System Overhead Time Slice is increased (the higher the percentage, the more likely the occurrence of the issue). When the controller is switched to Program mode and the Continuous Task continues to scan, these system behaviors take place: - The RUN status indicator turns off. - The Continuous Task continues to be scanned and logic within the Continuous Task is solved. This behavior is observable in the logic window for the Continuous Task in RSLogix 5000 software. - Any computer terminals online with the controller indicate that the controller is in Program mode. - All Periodic and Event-based tasks are put into Program mode. - All I/O modules are put into and behave as in Program mode. Specifically, on output modules, output values will not update, even though the Continuous Task programming may try to update or change them. - All motion groups are put into Program mode (see the behaviors section below for more information). - Produced/consumed data continues to transfer. - All out-going communication (messages) are stopped. The following anomalous behaviors may result (depending on your application): • The producing controller may not be identified as being in Program mode. • Unexpected changes in outputs may occur when switched back to Run mode. • Load/Store into nonvolatile memory may not complete successfully. • Motion instructions may continue to be executed when in Program mode. Lgx00080240

Anomalies Corrected in Previous Firmware Revisions

Firmware Revision	Anomaly	Description
16.21	Serial/DF1 connections may timeout unexpectedly.	Serial connections made to the controller may timeout. Timeouts may be noticed in these situations: • If the programming terminal connection is made through the controller serial port, the timeout results in a lost connection between RSLogix 5000 software and the controller. • If communication is configured by using the DF1 driver in RSLinx software, the events log may contain notices of errors in the connection with the controller. • Message instructions may error and display error codes 16#203 (Connected timeout) and 16#204 (Unconnected timeout). Lgx00080320
	The Alarms and Events Buffer times out sooner than expected.	The Alarms and Events Buffer, when configured to use values higher than 72 minutes, may time out sooner than configured to. The early timeout may result in the loss of some Alarm data. Lgx00077990
16.20	Changing the controller mode from Run to Program is unsuccessful.	When the controller mode is changed from Run to Program and an alarm instruction has a delivery state of In Progress, the controller does not change modes. To view the delivery state, open the Alarm Properties dialog and click the Messages tab. This anomaly may occur even when the controller is not connected to a FactoryTalk Alarm server. Lgx00075913
	Simultaneous branches in a sequential function chart may not execute at the same time or in the same scan.	When executing a simultaneous branch, it may take two scans of the routine before all of the simultaneous branches execute. It does not take more than two scans for all simultaneous branches to completely execute. Lgx00075143
	During PreScan, a Major Recoverable Fault, Type 6, Code 1, occurs.	Each task programmed for a Logix controller has a PreScan Watchdog of 5 seconds. You cannot change this setting in RSLogix 5000 software. The fault typically occurs when these elements are present in the program: · Add-On Instructions that use PreScan mode. · A large program with many tasks and subroutines where a majority of the application memory is used by the application code and not tags. Other elements and factors may also cause the fault, however, those listed are the most common. When the fault occurs, the PreScan Watchdog has been exceeded. With this firmware revision, the PreScan Watchdog has been increased to 60 seconds. Lgx00077337

Anomalies Corrected in Previous Firmware Revisions

Firmware Revision	Anomaly	Description
16.20	Use of an ACL with other ASCII Serial Port instructions may result in a Major Non-Recoverable Fault.	If an ACL instruction is executed while other ASCII instructions are active, a Major Non-Recoverable Fault may occur. Lgx00076857
	Add-On Instructions yield unexpected results.	When calling an Add-On Instruction, if the data types of the tags passed into or out of the instruction do not match the parameter definitions, unexpected behavior can result. In the logic of an Add-On Instruction, reading a tag of type INT can also yield incorrect results. Lgx00075524
	Digital alarms (ALMD) may prematurely report an in-alarm state.	The tag InAlarm reports the alarm (InAlarm=1) before the time entered in the MinDurationPRE tag expires. Lgx00075889
16.04	PanelView Plus operator terminals utilizing the serial port to communicate with the controller will not establish communication at startup.	When the application on the PanelView Plus operator terminal begins to initialize communication with the controller, the controller responds with packets that exceed the 500-byte packet size. The PanelView Plus operator terminal then stops attempting communication with the controller. When this occurs, data is not updated on the PanelView Plus operator terminal. Lgx00074400
	Using FFL (FIFO load) or LFL (LIFO load) instructions in the same program as an Add-On Instruction may cause the controller to experience a Major Non-Recoverable Fault.	If an Add-On Instruction is executed after a FFL or LFL instruction in a given program, the internal registers are incorrectly written to and the result is a Major Non-Recoverable Fault. For the fault to occur, all of the following must be true: · The Add-On Instruction and FFL and LFL instruction must be in the same program in a Logix application. If the application has two programs defined and the Add-On Instructuction is in program A and the FFL or LFL are in program B, no anomaly will be seen. · The FFL/LFL instruction must load a scalar type (SINT, INT, DINT, or REAL). If the source value is a structure, no anomaly will be seen. · The FFL/LFL instruction must be scanned before the Add-On Instruction. If the Add-On Instruction comes first in the code, no anomaly will be seen. The rung condition does not matter. If the required conditions exist, the fault will occur during prescan. Lgx00074725
16.03	Extensive use of UID and UIE instructions results in a User-Task Watchdog timeout fault.	If you use extensive amounts of UID and UIE instructions, when the controller is put into Run mode, a Major Recoverable Fault type 6, code 1, Task Watchdog Expired, may be logged. Attempts to clear the fault and return to Run mode are unsuccessful. Lgx00050393

Anomalies Corrected in Previous Firmware Revisions

Firmware Revision	Anomaly	Description
16.03	Event Task Overlap Counter registers large values after the controller is put into Run mode.	If an application that uses event-based tasks is downloaded to the controller and then the controller is put into Run mode, the overlap counts for event-based tasks may exceed 800,000. This value is a false indication of task overlaps and does not affect the execution of event-based tasks. Lgx00058132
	Changes to RPI are not correlated between all workstations when multiple workstations are connected to the controller.	If you are online with one controller from two or more workstations and you alter the RPI setting for an I/O connection on one workstation, the change in RPI does not register on the other workstations. The change in RPI registers only if the altered RPI program is uploaded from the controller by the other workstations. Lgx00070714
	Minor faults logged multiple times when certain instructions are used.	The same minor faults, typically a minor math-overflow error, may be logged more than once, depending on the type of instructions used in the program. For example, if in a task the program contained a Multiply instruction that logged a math overflow error as a minor fault, a GSV instruction in the same program will log the same fault when it should not. Instructions affected include Message BTR, Message BTW, GSV, SSV, UIE, UID, STOD, STOR, STOI, PCMD, PSC, PATT, PDET, PCLF, PPD, and PRNP. Lgx00028500, Lgx00045361, and Lgx00045365
	LimitsInv and SelectLimitInv are swapped.	In the High/Low Limit (HLL) instruction: • LimitsInv parameter is set when the SelectLimit is invalid. • SelectLimitInv parameter is set when the HighLimit and LowLimit parameters are invalid. Lgx00055977
	Processing of denormalized number exceptions causes a Major Non-Recoverable Fault.	A denormalized number is any 32-bit, floating-point value that is less than 1.75494210 x 10^{-38} or greater than -1.75494210 x 10^{-38}, excluding zero. Denormalized numbers typically occur when very small real numbers are divided by very large real numbers. This anomaly typically occurs when the following sequence takes place. 1. The controller is handling an exception of a floating-point denormalized number in task A. 2. Then task B begins to execute and handles an exception of a floating-point denormalized number. 3. And, task B completes as task A begins again. Lgx00057774

Known Anomalies

This table lists known anomalies of controller revisions 16.00…16.22.

Known Anomalies for Firmware Revisions 16.00…16.22

Anomaly	Description
Program is lost after clearing an I/O fault.	After clearing a fault due to a missing I/O module and cycling power to the CompactLogix controller, the program is lost from controller memory and no fault is logged. Lgx00082169
An invalid Process Variable (PV) used by a Proportional Integral Derivative (PID) instruction results in a control loss of the PV.	When an invalid Process Variable (PV) value, for example, a positive infinity (INF) or not a number (NaN), is used by the Proportional Integral Derivative (PID) instruction, the PID instruction becomes stuck and control of the PV is lost. To reset the instruction and recover control, you have to access the .Data array of the PID instruction and clear any values that are invalid. The PID instruction would then begin to control the PV. Lgx00082890
Use of an FFU instruction in an SFC program results in a major nonrecoverable fault (MNRF).	Use of an FFU instruction in an SFC program results in a major nonrecoverable fault (MNRF) when the last scan of the SFC is configured to Auto Reset. Lgx00096621
Use of FIND instruction results in a major recoverable fault (MRF)	Attempts to use the FIND instruction to search a large string of characters results in a MRF. If you attempt to use the ASCII FIND instruction to search a source-data string of 32,767 characters, or more, a major fault Type 4 Code 51 results. Lgx00094007
Carry Status flag not set as expected.	When certain values are converted from a floating-point number to an integer, the Carry Status flag (S:C) is not set as expected for the value being converted. Lgx00074175
Using an SSV instruction to set a task priority of 0 results in unexpected execution times.	If you use an SSV instruction to set a task's priority at 0 (by using the class name Task, attribute Priority), abnormal task execution times result. This because tasks cannot have a priority of 0 (permissible priority values are 1…15). To avoid abnormal task execution times, do not use the SSV instruction to set a task's priority at 0. Lgx00076850

Known Anomalies for Firmware Revisions 16.00…16.22

Anomaly	Description
Setting the WALLCLOCKTIME object may result in a Major Nonrecoverable Fault (MNRF) or an incorrect WALLCLOCKTIME value.	Using an SSV instruction to set the local controller's WALLCLOCKTIME using the LocalDateTime attribute may result in an incorrect WALLCLOCKTIME value upon execution of the program. This incorrect time is usually evident in the seconds field. The discrepancy in the WALLCLOCKTIME may also result in a MNRF during controller power down or just after controller power has been cycled. To avoid this behavior, use the DateTime attribute and arithmetic to handle the GMT offset instead of using the LocalDateTime attribute to set the local controllers WALLCLOCKTIME object. Lgx00078925
Setting the message timeout bit (.TO) causes a major nonrecoverable fault (MNRF).	Setting the message timeout bit (.TO) within the message control structure while the message is active may result in a MNRF of the controller. To avoid the MNRF, do not manipulate the message timeout bit (.TO). Instead, change the values for the unconnected timeout (.UnconnectedTimeout) and connection rate (.ConnectionRate) in the message control structure. Changing the unconnected timeout (.UnconnectedTimeout) and connection rate (.ConnectionRate) values from their defaults to smaller values causes the message instruction to error earlier and avoids the MNRF. For more information about changing the values in the message control structure, see the Logix5000 Controllers General Instruction Reference Manual, publication 1756-RM003. Lgx00098991
Serial-port control structure bit RN inaccurately cleared.	This anomaly occurs when using firmware revision 16.20 or later. If the ACL instruction is used to clear instructions from the ASCII queue, the serial-port control structures' RN bit is cleared (that is, the RN bit is set to zero) although it should not be. Lgx00081063
Use of revision 16 firmware and the controller serial port results in extended program scan times.	If you use firmware at revision 16, including revisions 16.03...6.21, and the controller's serial port, the program scan time may increase. The program scan time increase in revision 16 may be 2...10 times the scan time of the same program with revision 15. This anomaly only occurs when the controller serial port is used and there is no workaround. Lgx00077845
Indirectly addressing an instance tag in an Add-On Instruction results in a Major Non-Recoverable Fault.	When an indirectly-addressed instance tag is used instead of a directly- addressed instance tag within an Add-On Instruction, a Major Non-Recoverable Fault occurs. Typically the major fault occurs during the prescan of the controller. See the Restrictions section on page 19 for more information about this anomaly. Lgx00077261

Known Anomalies for Firmware Revisions 16.00…16.22

Anomaly	Description
When the nonvolatile restore option is set to load On Corrupt Memory, the program may not restore.	This anomaly typically occurs with new controllers or controllers that register a Major Non-Recoverable Fault. If the nonvolatile restore option is set to load On Corrupt Memory and a corrupt memory condition is detected, the controller program may not be restored. Lgx00064843
PI function block appears to stop executing as the output does not change and no instruction faults are logged.	If the PI instruction is being used in Linear mode, this floating-point equation is used to calculate the ITerm. $Kp \times Wld \times \frac{WldInput + WldInput_{n-1}}{2} \times DeltaT + ITerm_{n-1}$ Due to the use of the single-precision floating point values, it may be possible, depending on the values of WLD and KP, for the ITerm value to be small enough, less than 0.0000001, to be lost when adding to the $ITerm_{n-1}$. For more information regarding the PI instruction, see the Logix5000 Controllers Process Control and Drives Instructions User Manual, publication 1756-RM006. Lgx00070832
Changes made to a timeout in the alarms system require a new download of the program to controller.	To verify that the timeout change is used by the controller, you must download the program to the controller after each change to the timeout variable. Lgx00069461
The Slot Status bit for an I/O connection is slow to update if the connection is lost.	When using I/O on an Ethernet network, if the connection to the network is lost at the adapter, the SlotStatusBit for that connection will not register the disconnect for 9 seconds or more. If you require loss-of-connection data more quickly than the 9 seconds, use the GSV instruction to monitor the entry status of the connection as it updates more quickly than the SlotStatusBit. Lgx00072697
When the SFC instruction's Last Scan of Active Steps option is set to Automatic Reset, a Major Non-Recoverable Fault occurs.	A Major Non-Recoverable Fault may occur when these elements are present in the program: · Within an SFC, a JSR instruction is used to jump to another SFC, also know as a nested SFC. · One or more of the nested SFC instructions contains Simultaneous Branches. · The Last Scan of Active Steps option (specified in the SFC Execution tab of the controller Properties dialog) is set to Automatic Reset. To avoid a Major Non-Recoverable Fault when these elements are present, set the Last Scan of Active Steps to Don't Scan or to Programmatic Reset. Lgx00072702

Known Anomalies for Firmware Revisions 16.00…16.22

Anomaly	Description
A function block is initiated, either directly or indirectly by an SFC instruction, when the parent step becomes active.	During the first scan of an SFC step, the Step.FS bit is set. In addition, the S:FS bit is set, which allows the logic in any associated actions to easily detect the first scan state. This behavior is useful when a subroutine that is called by multiple actions (actions that may be connected to other steps) is used. The first scan state can be detected without programming a reference to the tag of a specific step. Many function blocks contain internal data that must be initialized before the block can be used. One of the methods a block uses to determine if it should initialize is by evaluating the S:FS bit, which the function block identifies as the first scan following a prescan. Lgx00071558
An SFC R action continues to post-scan on the specified action.	This anomaly occurs only if the SFC Last Scan of Active Steps option is set to Programmatic Reset or Automatic Reset. When the default, Don't Scan, is set, the anomaly does not occur. The intention of a reset action, type R, is to terminate the execution of another action that was previously stored. When configured as described above, the reset action causes logic to execute a final scan. The reset action does not check to verify that an action is stored before it completes the final scan. As a result, each time the reset action is scanned, the target logic will be scanned one last time. These observable behaviors may result: • The timer of the stored action will continue to time even though the action is no longer active. • The logic in the stored action will be executed in the configured mode. • At Automatic Reset, non-retentive outputs are cleared. • At Programmatic Reset, the logic will execute. In this situation, the action logic checks for the final scan condition (action.A = 1 and action.Q = 0) and performs some shutdown operations. This is the code that will be executed. Lgx00069295
A 1769-L31 controller firmware upgrade fails if configured at 38,400 bps or higher.	When upgrading firmware on a 1769-L31 controller, if the serial DF1 driver is configured to operate at a baud rate higher than 19,200 bps, the upgrade may fail. If a flash upgrade fails, you must cycle power to the controller, reset the baud rate to 19,200 bps, and initiate a new flash upgrade. Lgx00070538

Known Anomalies for Firmware Revisions 16.00…16.22

Anomaly	Description
Attempts to download a program to a controller following a failed firmware upgrade are successful. (Failure is indicated by the OK status indicator flashing red after the upgrade is complete.)	After a firmware upgrade attempt fails during the upgrade, (for example, the cable is disconnected or communication is interrupted) the controller's OK status indicator flashes red and any user attempts to clear the fault by toggling the controller's keyswitch are unsuccessful. You can download a program to the controller, place the controller in Run mode, and run the program (the RUN status indicator displays run status). The outputs behave as specified by the program. However, when controller power is cycled, the program is lost and the controller properties indicate a firmware revision different from that most recently downloaded to the controller. Lgx00071250

Restrictions

These restrictions apply to the use of ControlLogix controllers at any minor revision of firmware revision 16 (that is, firmware revisions 16.03…16.22).

Restrictions with Firmware Revision 16 (through 16.22)

Restriction	Description
Use of an indirectly-indexed tag within an Add-On Instruction instance tag is not accepted by the RSLogix 5000 program.	In RSLogix 5000 software, version 16.00, if you use an indirectly-indexed array in an instance tag of an Add-On Instruction, anomalous behavior may result. For example, in the instruction call `MyAOI(AOIData[Index])`, the value `[Index]` selects the `AOIData` tag element used to call `MyAOI`. The use of `[Index]` results in anomalous behavior when the program is executed. In RSLogix 5000 software, version 16.03, and controllers firmware revision 16.20, if an indirectly-indexed tag is used in an instance tag, the edit is not accepted by the program. Instead, use a directly-indexed instance tag. For example, instead of using tag `MyAOI(AOIData[Index])`, use tag `MyAOI(AOIData[2])` or similar so that the exact element of the array is directly-indexed. The program accepts directly-indexed instance tags. You may continue to use indirectly-addressed tags in Add-On Instruction parameters without anomalous behavior in RSLogix 5000 software, versions 16.00 and 16.03. Lgx00077261

Restrictions with Firmware Revision 16 (through 16.22)

Restriction	Description
Passing a User-defined Data Type (UDT) into an Add-On Instruction results in a Major Recoverable Fault or data memory corruption.	An anomaly occurs when you pass a tag based on a User-defined Data Type (UDT) into an Add-On Instruction, and certain conditions are met that result in a Major Recoverable Fault or data memory corruption. A Major Recoverable Fault or data memory corruption may occur in these conditions: • A one-dimensional array tag that is based on a UDT is passed into the Add-On Instruction. • The UDT tag contains a member that is a one-dimensional array. • Inside the Add-On Instruction, an operand address that specifies an immediate member of the UDT tag array and a variable element of the member array (for example, array[0].memberArray[x] is used). Examples: `UDT array[0].memberArray[x]` When the size of the UDT array is smaller than that of the memberArray and the [x] value of the memberArray is larger than the size of the UDT array, a Major Recoverable Fault Code 4 Type 20 occurs. `UDT array[0].memberArray[x]` When the size of the UDT array is bigger than the memberArray and the [x] value is smaller than the size of the UDT Array but larger than the size of the memberArray, the expected fault does not occur and the data is written to a location outside the bounds of the memberArray. Lgx00077270 and Lgx00076136
An upload of an Add-On Instructions with a literal boolean input parameter modifies offline image.	When an Add-On Instruction containing a literal value for one of it's Boolean input parameters is referenced from a Ladder Diagram routine, an upload of the project will modify the display of the literal value by appending a ".0". Each time the project is downloaded and re-uploaded, another ".0" is appended, so that after the second download/upload sequence, the project file will not verify and can no longer be downloaded without first editing the modified literal value. The edit may be successfully performed either online or offline. Note, however, that when editing online, because the rung is in an unverified state, the "Finalize All Edits in Program" will not operate. In this case, use of the Accept/Test/Assemble sequence of operations will allow the edit to be completed. This condition does not affect the executing image, which will continue execution using the unmodified literal value. To avoid exposure to this problem, replace the literal value with a reference to a tag having the desired value. Lgx00077802

Known Issues

The following are known issues associated with this controller revision:

- With a 1769-L31 controller, you cannot bridge from one serial port to the other. You can bridge from either serial port to DeviceNet network via the 1769-SDN scanner.

- Tasks are the basic scheduling mechanism for executing a program and are created as part of the project and program creation process. In addition to other internal tasks, the CompactLogix controllers have an internal task to provide communication with the 1769 I/O modules. This task executes periodically at the Requested Packet Interval (RPI) selected in the properties of the CompactBus. If the task has not completed before it is time to execute again, a task overlap occurs. This task overlap causes the controller to declare a minor fault of Type = 6 (Task Overlap), Code = 4 (VA task).

  You can use various strategies to resolve minor faults due to task watchdog timeout and/or task overlap. For more information, see RSLogix 5000 Online Help “Identifying and Managing Tasks”. In the case of a minor fault caused by VA task overlap, increase the RPI until the overlap no longer occurs.

- If a 1769 I/O fault occurs, you must cycle power to the CompactLogix controller after clearing the major fault. I/O communication are not restored until after the power cycle. You should never use the fault handling routine to clear local I/O faults. You should clear local I/O faults manually on a per case basis, and then the controller should be power cycled.

- RSLogix 5000 software creates tags for modules when you add them to the I/O configuration. The 1769 module tags define configuration (C) data type members that may include attributes for alternate outputs. The CompactLogix system does not enable local modules to use the alternate outputs. Do not configure the attributes listed below.

For Digital Output Modules	For Analog Output Modules
• ProgToFaultEn • ProgMode • ProgValue • FaultMode • FaultValue	• CHxProgToFaultEn • CHxProgMode • CHxFaultMode • Where CHx = the channel number

Any 1769 Compact I/O modules used as remote I/O modules in a CompactLogix system do support the Hold Last State and User-defined Safe State features.

Hold Last State and User-defined Safe State Not Supported

When 1769 Compact I/O modules are used as local I/O modules in a CompactLogix system, the local I/O modules do not support the Hold Last State or User-defined Safe State features, even though you can configure these options in the programming software.

If a local I/O module fails such that its communication to the controller is lost, or if any module is disconnected from the system bus while under power, the controller will go into the fault mode. All outputs turn off when the system bus or any module faults.

Install the Controller Revision

To install the latest ControlLogix controllers revision, go to http://www.rockwellautomation.com/support to download your revision. Then use the ControlFlash utility to upgrade your controller.

Alternatively, if you have installed RSLogix 5000 software, version 16, and related firmware, you may not need to complete the tasks described. The AutoFlash feature of RSLogix 5000 software, version 16, detects if your controller firmware needs upgraded upon a program download to the controller. If a firmware upgrade is necessary, AutoFlash will initiate an update.

After you have completed your firmware upgrade, you should complete these steps to verify that the upgrade was successful.

1. Cycle power to the controller.
2. Go online with the controller and view controller properties.
3. Verify that the firmware revision listed matches the firmware to which you intended to upgrade.
4. If the controller's firmware is not correct, initiate another firmware upgrade.

For more information about errors when completing a ControlFlash upgrade, see the ControlFlash Firmware Upgrade Kit Quick Start, publication 1756-QS105.

Additional Memory Requirements

Revision 16.00 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 this table.

If you have this firmware revision (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)**
16.*x* or earlier	Tag that uses ALARM_ANALOG data type (with no associated tag references)	16 bytes		✓
	Tag that uses ALARM_DIGITAL data type (with no associated tag references)	4 bytes		✓
	Tag that uses the COORDINATE_SYSTEM data type	132 bytes		✓
	Tag that uses ALARM_ANALOG data type (if associated tags are configured for the ALARM_ANALOG tag)	22 bytes + (9 x the number of configured, associated tags) + (3 x the sum of the bytes used by the data type of each of the configured associated tags) For example, an analog alarm moved to V16.03 with two Associated Tags – one DINT (4 bytes) and one STRING (88 bytes) would need to add: 22 + 9(2) + 3(92) = 316 bytes		✓

If you have this firmware revision (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)**
15.*x* or earlier	Input module	4 bytes	✓	
	Produced tag	12 bytes	✓	
	Consumed tag	4 bytes	✓	
	Task	20 bytes		✓
	Program or equipment phase	24 bytes		✓
	Routine	4 bytes		✓
	Tag that uses COORDINATE_SYSTEM data type	748 bytes		✓
	Tag the uses any AXIS data type	800 bytes		✓
	Serial port	1120 bytes		✓
	Project	4012 bytes		✓
14.*x* or earlier	Tag that uses the COORDINATE SYSTEM data type	60 bytes		✓
	Tag that uses any AXIS data type	4 bytes		✓
13.*x* or earlier	Program	12 bytes		✓
	Task	4 bytes		✓
	User-defined data type	4 bytes		✓
	I/O module	16 bytes	✓ (8 bytes)	✓ (8 bytes)
	Produced or consumed tag	8 bytes	✓	
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 (such as a 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		✓

If you have this firmware revision (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)**
11.*x* or earlier	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, such as an 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 (such as UDT_1[5])			(-60 bytes)		✓
10.*x* or earlier	Program			12 bytes		✓
	Routine			16 bytes		✓
9.*x* or earlier	Tag that uses the MESSAGE data type			376 bytes		✓
7.*x* or earlier	Project			1050 bytes	✓	
	Tag			0.55 bytes		✓
	Message that transfers more than 500 bytes of data and targets 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 Tag			24 bytes		✓
	Alias Tag			16 bytes		✓
	Produced or Consumed tag	Data type	Bytes per tag			
		DINT	4	12 bytes	✓	
		REAL	4	12 bytes	✓	
6.*x*	Routine			68 bytes		✓
5.*x* or earlier	Routine			116 bytes		✓

Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Logix5000 Controllers Common Procedures Reference Manual, publication 1756-PM001	Contains information specific to Add-On Instructions.
CompactLogix Controllers Revision 15 Release Notes, publication 1769-RN015	Describes anomalies and enhancements related to controller revision 15.
Logix5000 Process Control and Drives Instructions Reference Manual, publication 1756-RM006	Contains information specific to the PI instruction.
ControlFlash Firmware Upgrade Kit Quick Start, publication 1756-QS105	Contains informations about firmware upgrades, installation instructions, and error messages.
POINT I/O EtherNet/IP Adapter Release Notes, publication 1734-RN002	Further describes the firmware upgrade to 2.003.
ArmorPoint I/O Release Notes, publication 1738-RN002	Further describes the firmware upgrade to 2.003.

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

Tech Notes and other resources are available at the Technical Support Knowledgebase, http://www.rockwellautomation.com/knowledgebase.

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