Reference Manual

Allen-Bradley

Replacement Guidelines: ControlLogix 5560/5570 to ControlLogix 5580

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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This manual is intended to offer guidelines when replacing a ControlLogix® 5560 or ControlLogix 5570 controller with a ControlLogix 5580 controller.

The manual discusses the features, functions, and what's new in the ControlLogix 5580 controller. It provides a reference to what capabilities the ControlLogix 5580 controller has, and how the capabilities differ from other ControlLogix controllers.

Throughout this manual, guidelines that reference a ControlLogix 5570 controller also apply to a ControlLogix 5560 controller.

Product compatibility information and release notes are available online within the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

Integrated Architecture Tools

The Integrated Architecture® system can help you plan and configure a system, and migrate system architectures. For more information, go to: http://www.rockwellautomation.com/rockwellautomation/products-technologies/integrated-architecture/tools/overview.page?

Migration Services

Rockwell Automation can help you get the most out of your current equipment, to help you determine your next steps, and to help you plan for the transition to newer technology.

Whether you choose to migrate all at once or use our unique, phased approach to help minimize the costs, risks, and complexities that are involved with managing legacy products and systems, Rockwell Automation has the tools and the experience to guide you through the transition.

For more information, see Migration Solutions Brochure, publication MIGRAT-BR002.

Additional Resources

These resources contain information about related products from Rockwell Automation.

These documents contain more information about Logix5000™ controllers.

Resource	Description
• EtherNet/IP Communication Modules in 5000 Series Systems, publication ENET-UM004 • EtherNet/IP Network Configuration User Manual, publication ENET-UM001 • ControlNet Network Configuration User Manual, publication CNET-UM001 • DeviceNet Network Configuration User Manual, publication DNET-UM004	Networks
• Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001 • Logix Controllers Instructions Reference Manual, publication 1756-RM009 • Logix5000 Controllers Advanced Process Control and Drives Instructions Reference Manual, publication 1756-RM006 • Logix5000 Controllers Motion Instructions Reference Manual, publication MOTION-RM002 • Logix5000 Controllers Import/Export Reference Manual, publication 1756-RM084	Logix5000 Software and Programming
• ControlLogix 5580 Controllers Product Information, publication 1756-PC405 • ControlLogix 5580 Controllers User Manual, publication 1756-UM543 • 1756 ControlLogix Controllers Technical Data, publication 1756-TD001 • ControlLogix Chassis and Power Supply, publication 1756-IN005 • 1756 ControlLogix Chassis Specifications Technical Data, publication 1756-TD006	ControlLogix Controllers, Chassis, and Power Supply

You can view or download publications at http://www.rockwellautomation.com/literature/.

To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Websites

Resource	Description
http://www.ab.com/logix/	Logix Product Information
http://www.ab.com/networks/	Network Product Information
Product Compatibility and Download Center (PCDC)	Product-related downloads including firmware, release notes, associated software, drivers, tools, and utilities (product serial number required)
http://samplecode.rockwellautomation.com	Studio 5000 Logix Designer® Sample Code

Replacement Considerations

This chapter describes features and functions that are associated with the ControlLogix® 5580 controller. These features and functions do not represent a complete picture of a ControlLogix controller, rather a picture of what is new or changed in the controller at this release:

- Embedded 10/100/1000 Mbps Ethernet port.
- Higher performance and capacity including:
  - Motion Processing: 256 total axes
  - Total I/O packets processing: 128,000 pps
  - 320 unconnected message buffers
  - 256 simultaneous cached message instructions in the running state
  - Support for up to 300 EtherNet/IP devices.
- Support for 5069 Compact I/O™
- Change Ethernet port speed without a module reset

Minimum Requirements

The ControlLogix 5580 controller has these minimum requirements.

Requirement, minimum	ControlLogix 5580 Controller	ControlLogix 5570 Controller
Chassis	1756-A4, 1756-A7, 1756-A10, 1756-A13, 1756-A17 0 °C < Ta < +60 °C (+32 °F < Ta < +140 °F) for Series C Chassis 0 °C < Ta < +50 °C (+32 °F < Ta < +122 °F) for Series B Chassis	1756-A4, 1756-A7, 1756-A10, 1756-A13, 1756-A17 Series A, Series B, and Series C
Programming Software	Studio 5000 Logix Designer® Application Version 28.00.00 or later	Studio 5000 Automation Engineering & Design Environment™ Version 21.00.00 or later

Product Comparison

The ControlLogix 5580 controllers operate similar to the ControlLogix 5570 controllers, with these differences.

Table 1 - Technical Specifications

Attribute	ControlLogix 5580 Controller	ControlLogix 5570 Controller
Memory	1756-L83E: 10 MB User Memory 1756-L85E: 40 MB User Memory	4…32 MB user memory, 0.98 MB I/O memory
5069 Compact I/O™ supported	Full support	Not supported
Embedded Ethernet	10/100/1000 Mbps	N/A
Controller resources	1756-L83E: 100 EtherNet/IP nodes, max 1756-L85E: 300 EtherNet/IP nodes, max	Controller connections: 500
Ethernet performance	Ethernet I/O (Class 0/1): 128,000 packets per second Ethernet Messaging (Class 3): 2000 messages per second(2)	N/A
Unconnected message buffers	320	20
Concurrent cached message instructions in the running state	256	32
Integrated motion	EtherNet/IP network	• SERCOS interface • Analog options (encoder input, LDT input, SSI input) • EtherNet/IP network
Motion axes	256, any combination of these supported axis types: • CIP • Consumed • Virtual • Position loop drives	128, any combination of these supported axis types: • CIP • Consumed • Virtual • Position loop drives • Servo • Servo drive • Generic
Axes/ms over backplane	19	8
Axes/ms over EtherNet/IP port	32 when using the built-in EtherNet/IP port at 1 Gbps. Rockwell Automation recommends using the built-in EtherNet/IP port for high-performance motion applications.	N/A
Voltage and current ratings	1.2 A @ 5.1 VDC 5.0 mA @ 1.2 VDC	800 mA @ 5.1 VDC 5.0 mA @ 1.2 VDC
Energy storage module	Embedded in controller, nonremovable	• 1756-ESMCAP capacitor energy storage module (removable) • 1756-ESMNSE capacitor energy storage module (removable) • 1756-ESMNRM capacitor energy storage module (nonremovable)
Weight, approx	0.394 kg (.868 lb)	0.25 kg (0.55 lb)
Wire category(1)	3 - on USB port 2 - on Ethernet port	3 - on USB port
Wire size	Ethernet cabling and installation according to IEC 61918 and IEC 61784-5-2	N/A
Reset Button	A stage 1 reset clears the user application program and memory, but retains the controller IP address. A stage 2 reset returns the controller to out-of box settings (including firmware), and clears all network settings.	N/A

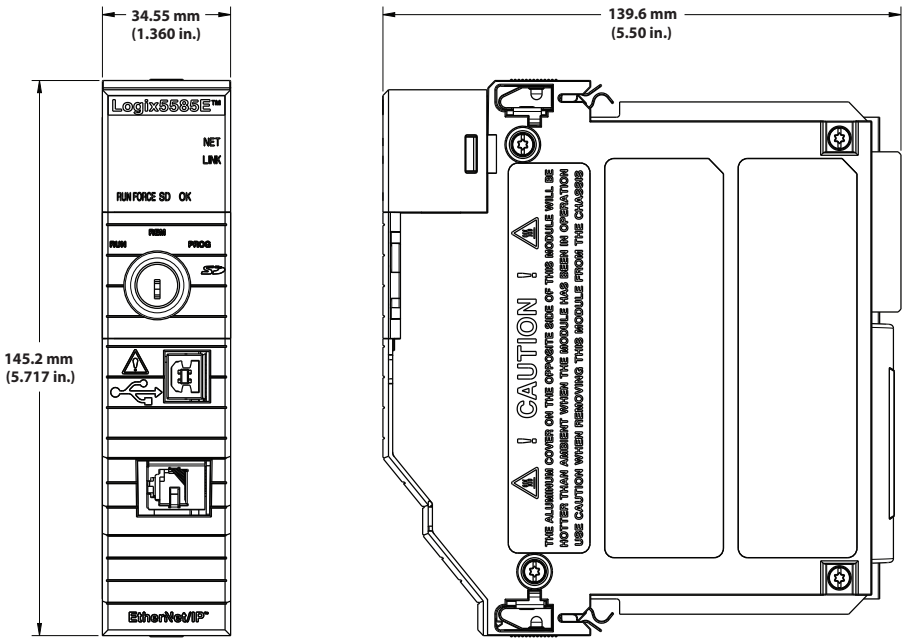
(1) Use this conductor category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

(2) Data size = 32-bits / 1-DINT

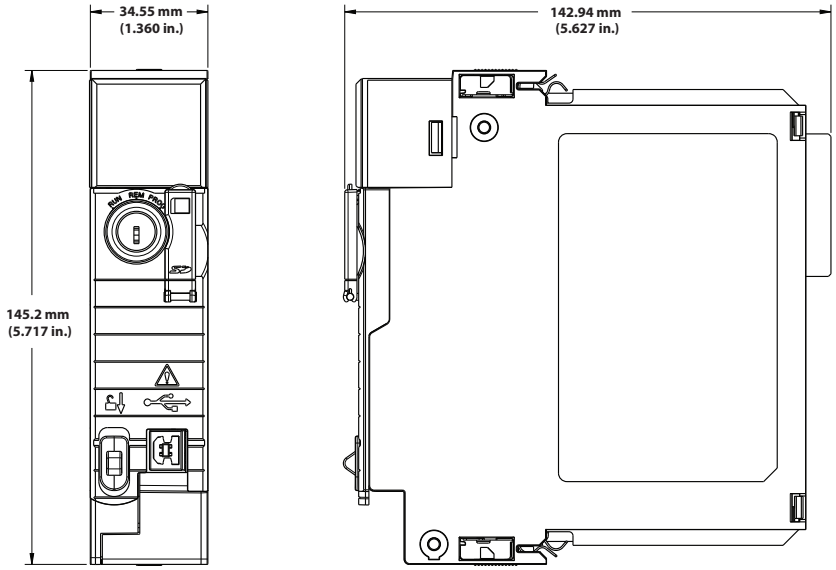
Controller Dimensions

This section shows the dimensional differences between ControlLogix 5580 and ControlLogix 5570 controllers.

ControlLogix 5580 Dimensions



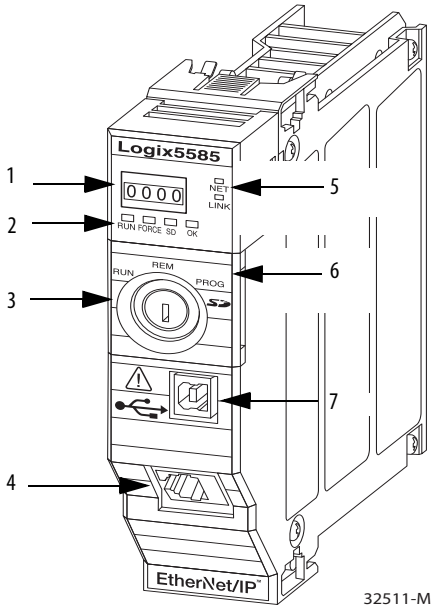
ControlLogix 5570 Dimensions



Connectors and Status Indicators

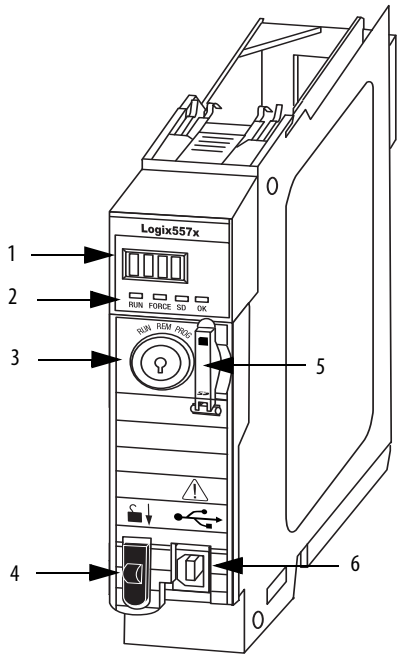
This section shows the front plate differences between ControlLogix 5580 and ControlLogix 5570 controllers. See Diagnostics and Status Indicators on page 63 for more information on the ControlLogix 5580 Status Indicators and the Reset Button.

ControlLogix 5580



Item	Description
1	4-character display
2	Status Indicators
3	REM RUN PROG Key
4	Ethernet Port
5	Ethernet Status Indicators
6	SD card slot and Reset Button are behind the door.
7	USB Port

ControlLogix 5570



Item	Description
1	4-character display
2	Status Indicators
3	REM RUN PROG Key
4	Energy Storage Module Release
5	SD card slot behind the door
6	USB Port

Project Size

The size of the .ACD file does not reflect the size of your project that downloads to the controller. The .ACD file contains multiple components, not all of which download to the controller.

Configure the Controller

Nodes on an EtherNet/IP Network

When configuring your ControlLogix 5580 control system, you must account for the number of EtherNet/IP nodes you include in the I/O configuration tree in your project.

Table 2 lists the EtherNet/IP node limits for ControlLogix 5580 controllers.

Table 2 - ControlLogix 5580 Controller EtherNet/IP Node Guidelines

Cat. No.	Maximum Number of EtherNet/IP Nodes Supported
1756-L83E	100
1756-L85E	300

IMPORTANT **EtherNet/IP communication modules that reside in the local chassis with the controller do not count as nodes, but EtherNet/IP devices that are connected to the communication modules do count as nodes.**

Any devices that you add directly to the Ethernet I/O configuration are counted toward the node limits of the controller. The following are example devices that must be counted:

- Remote communication adapters.
- Devices with an embedded EtherNet/IP port, such as I/O modules, drives, and linking devices.
- EtherNet/IP devices that are connected to a communication module in the local chassis, even though the communication module in the local chassis does not count as a node.
- Remote controllers.
- HMI devices that are included in the I/O configuration section, for example, PanelView™ Plus terminals.
- Third-party devices that are directly connected to the EtherNet/IP network.

Devices Excluded from the Node Count

Ethernet devices that exist on the EtherNet/IP network but are not added to the I/O configuration of the project do not count as nodes. These items are not added to the I/O Configuration, and are not considered nodes:

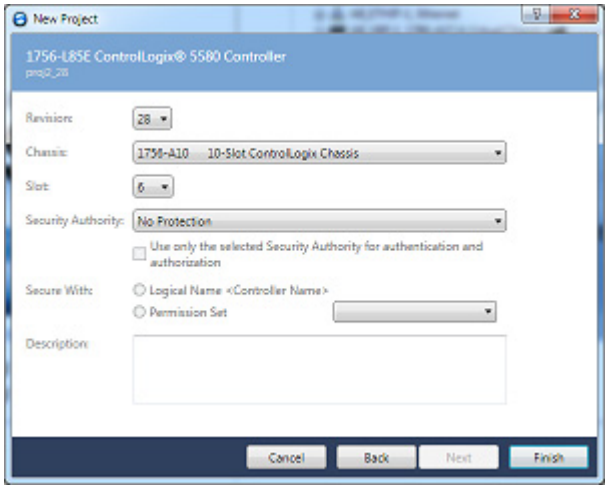
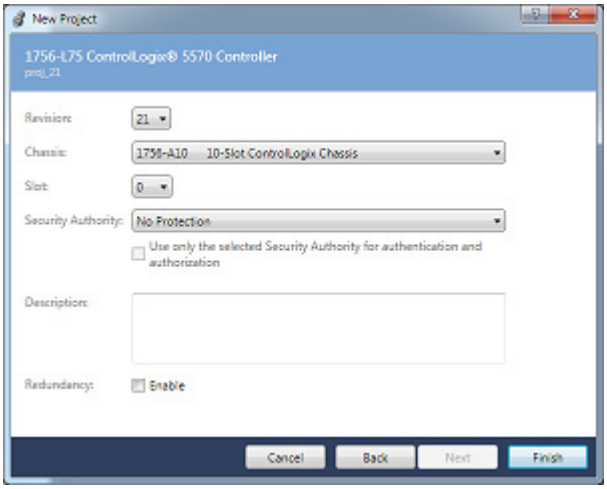
- Computer
- HMIs that are not added to the I/O configuration section.
- MSG Instructions
- Standard Ethernet devices that the controllers use a socket interface to communicate with.

Module Definition Dialog Box

This section describes the ControlLogix 5580 controller module definition dialog box. For complete information about the Module Definition dialog boxes, see the Logix Designer help located in the software.

When you create a project with a ControlLogix 5580 controller, the Module Definition dialog box appears. The dialog box provides standard controller settings, along with additional security settings. The information that is entered in this dialog box displays on the Controller Properties General tab and Security Tab.

Table 3 - New Project Module Definition

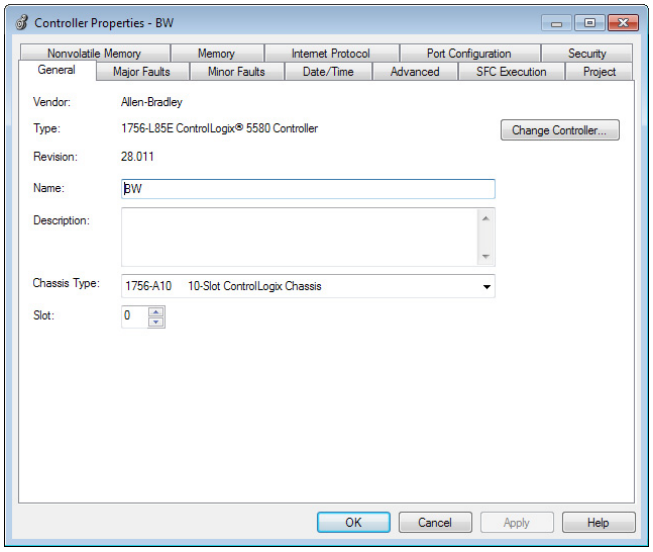
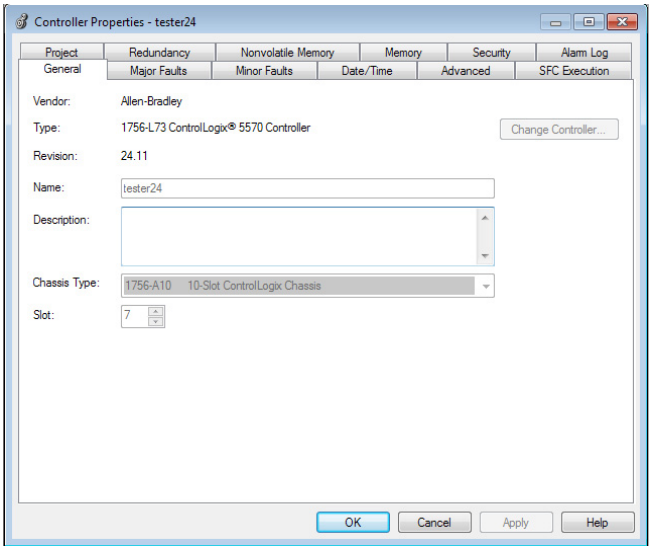
ControlLogix 5580 Example	ControlLogix 5570 Example
	

Controller Properties

This table compares Controller Properties between an ControlLogix 5570 and ControlLogix 5580 controller.

Controller Properties Tab	Comments
General	Same functionality as the ControlLogix 5570 controller.
Major Faults	Same functionality as the ControlLogix 5570 controller.
Minor Faults	Same functionality as the ControlLogix 5570 controller.
Date/Time	For new ControlLogix 5580 controller projects, the Enable Time Synchronization setting defaults to unchecked. See Date/Time Tab on page 14.
Advanced	New parameter to enable Minor Overflow fault reporting. System Overhead Time Slice parameter removed. See Advanced Tab on page 15.
SFC Execution	Same functionality as the ControlLogix 5570 controller.
Project	Same functionality as the ControlLogix 5570 controller.
Redundancy	Currently not available for ControlLogix 5580 controllers
Nonvolatile Memory	Same functionality as the ControlLogix 5570 controller.
Internet Protocol	New for ControlLogix 5580 controllers. See Internet Protocol Tab on page 16.
Port Configuration	New for ControlLogix 5580 controllers. See Port Configuration Tab on page 17.
Security	Now has additional security parameters. See Security Tab on page 18.
Alarm Log	Currently not available for ControlLogix 5580 controllers.

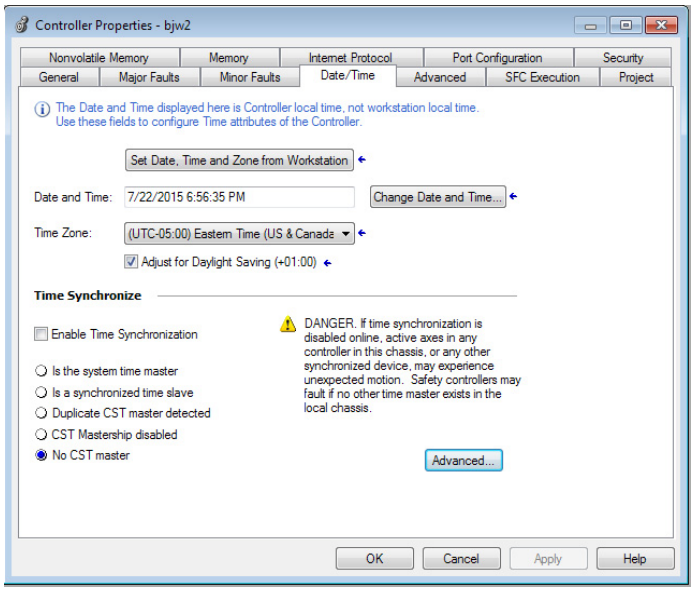
Figure 1 - ControlLogix 5580 Controller Properties Tabs

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Date/Time Tab

For new ControlLogix 5580 controller projects, the Enable Time Synchronization setting on the Date/Time page defaults to unchecked.

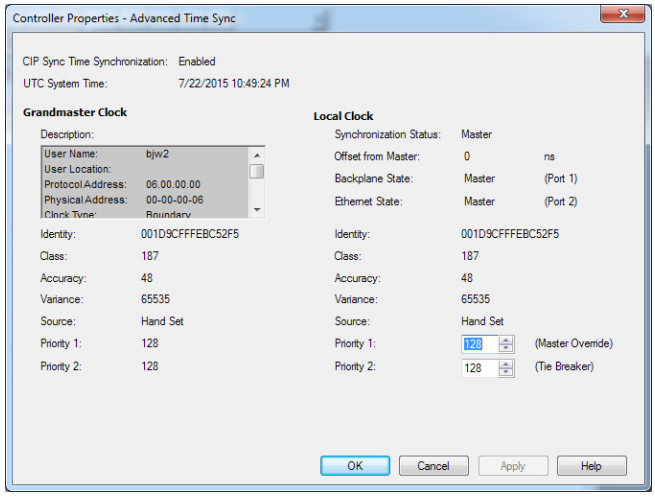
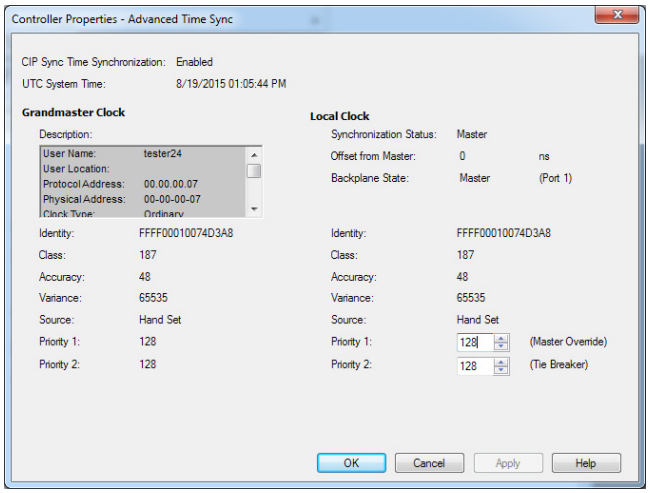
Figure 2 - ControlLogix 5580 Controller Properties - Date/Time Tab



Advanced Time Sync

The Advanced Time Sync dialog box displays information that is related to CIP Sync time synchronization. The information appears only if the project is online and CIP Sync is enabled. For the ControlLogix 5580 controller, Advanced Time Sync adds the state for the Ethernet Port. For parameter descriptions, see the ControlLogix 5580 Controllers User Manual, publication 1756-UM543.

Figure 3 - Advanced Time Synchronization Report for the ControlLogix 5580 Controller

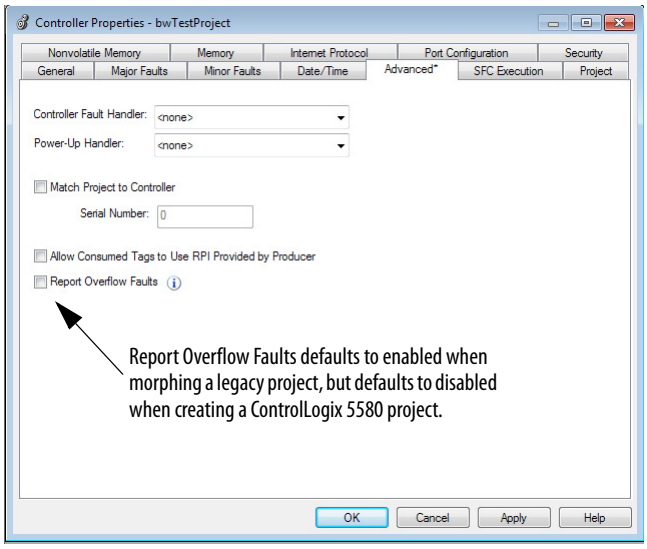
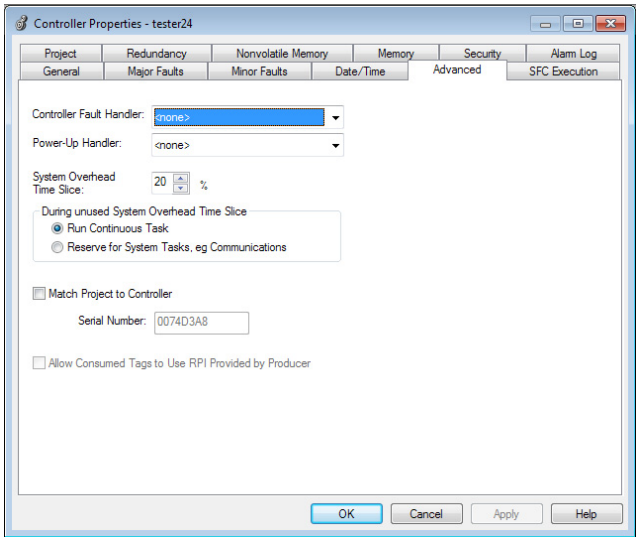
ControlLogix 5580 Example	ControlLogix 5570 Example
	

Advanced Tab

The Advanced tab provides a way to assign the Controller Fault Handler and Power-up Handler. You can also match a project to a specific controller by serial number.

- Report Overflow Faults is a new parameter that lets you control Minor Overflow fault reporting. When you create a project, the default setting is disabled. When you import or open a legacy project, the default setting is enabled. See Minor Fault on Overflow on page 51
- System Overhead Time Slice is no longer required for the ControlLogix 5580 controller, and the parameter is removed.

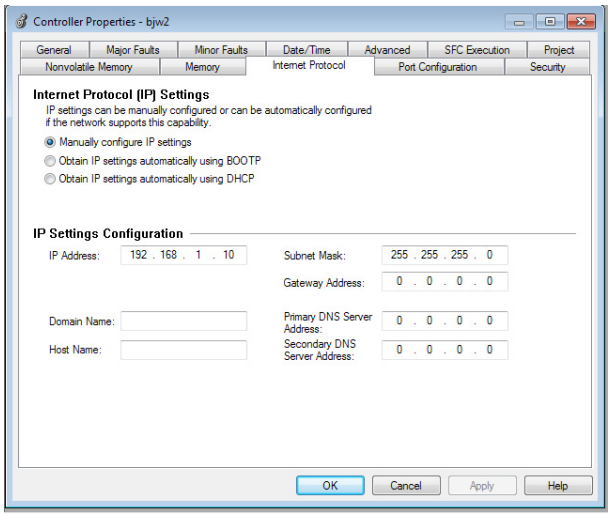
Figure 4 - ControlLogix 5580 Controller Advanced Tab

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Internet Protocol Tab

When online with the controller, the Internet Protocol page lets you configure the IP Settings. These settings are not available offline.

Figure 5 - ControlLogix 5580 Controller Internet Protocol Tab - Online



When online, configurable settings include:

- Source of IP Settings (DHCP, BOOTP, or manual configuration)
- Physical Module IP Address
- Subnet Mask
- Gateway Address
- Domain Name
- Host Name, Primary DNS Server Address
- Secondary DNS Server Address.

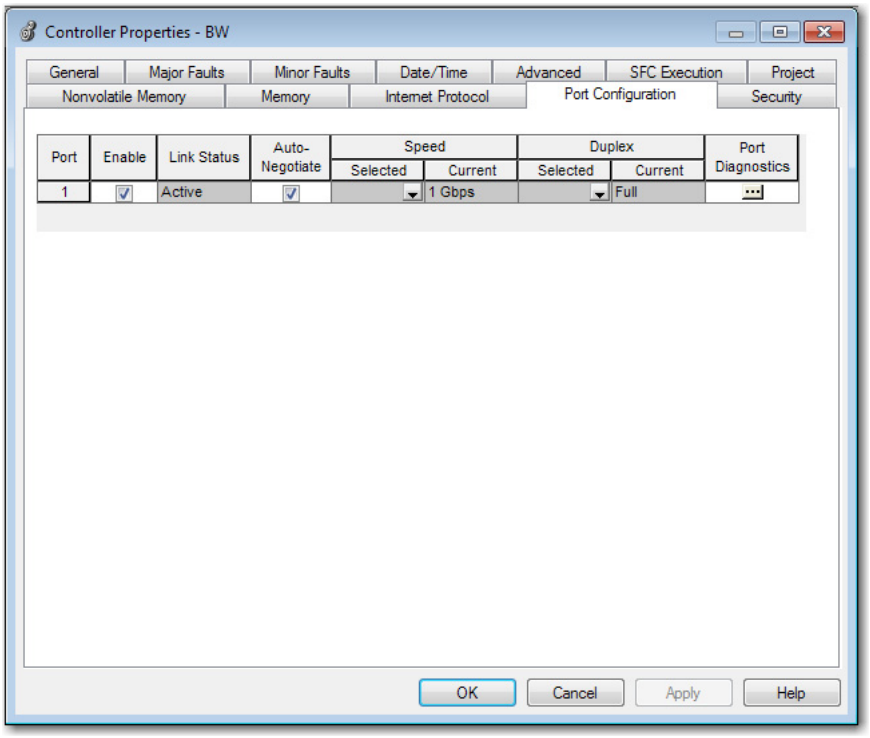
Port Configuration Tab

When online, the Port Configuration tab allows you to view and configure the Ethernet port settings:

- View Link Status
- Enable/Disable the Ethernet port
- Configure Auto-Negotiate
- Configure Selected Speed up to 1 Gbps (or set to auto-negotiate)
- View Current Speed
- Configure Selected Duplex. The ControlLogix 5580 controller only supports auto-negotiate or full-duplex.
- View Current Duplex
- Access the Port Diagnostics dialog

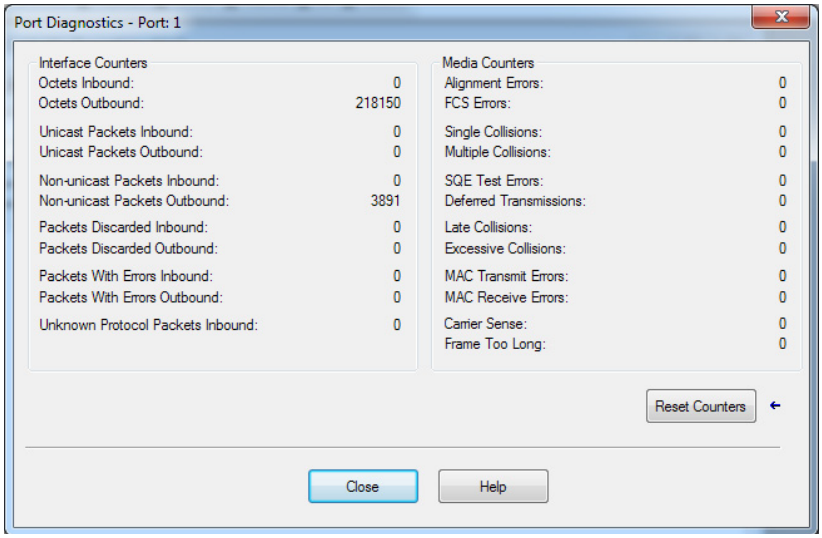
You can change the Port Configuration parameters without resetting the controller.

Figure 6 - ControlLogix 5580 Controller Port Configuration Tab



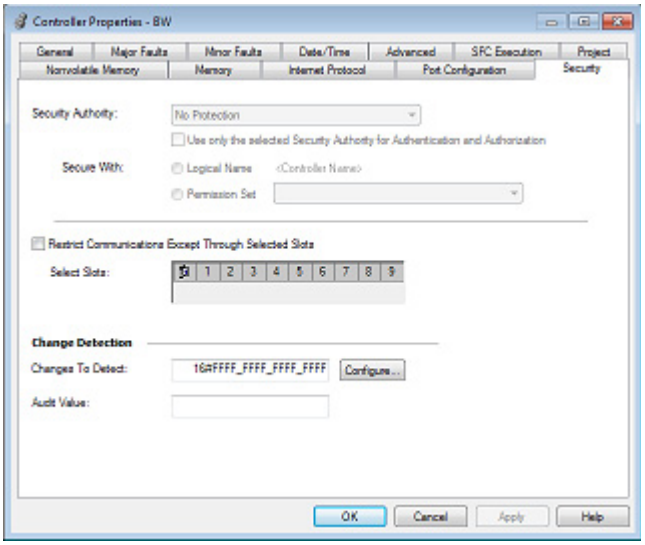
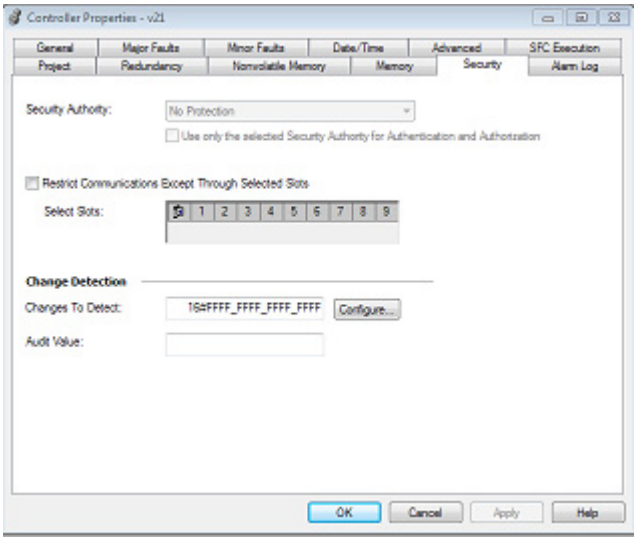
Port Diagnostics

On the Port Configuration category, click the Port Diagnostics button to view information for the Ethernet port. For parameter descriptions, see the ControlLogix 5580 Controllers User Manual, publication 1756-UM543.



Security Tab

The Security Tab now includes the Secure With parameters. See the Logix Designer Online Help for information on this parameter.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Controller Reset Button

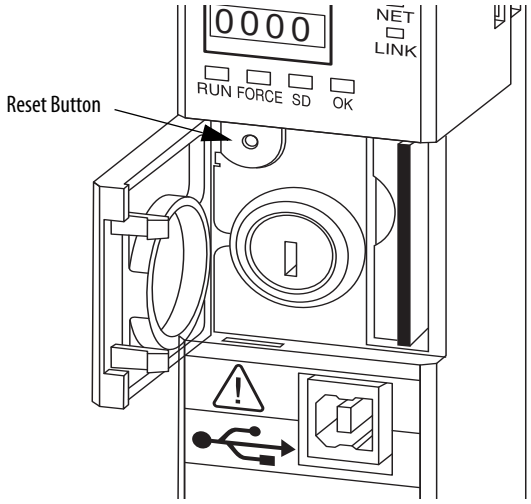
You can reset the controller with the reset button located behind the front door on the controller. The controller has two stages of reset:

- A stage 1 reset clears the application program and memory, but retains the IP address and all object attributes designated as non-volatile. A stage 1 reset occurs only if the controller contains a user application.
- A stage 2 reset returns the controller to out-of box settings (including firmware), and clears all network settings. A stage 2 reset occurs only if the controller does not contain a user application, and the current controller firmware is not a 1.x version.
- For information on how to use the Reset Button, see the ControlLogix 5580 Controllers User Manual, publication 1756-UM543.

IMPORTANT

- Since port enable/disable status is associated with the application program, ports become enabled after a Stage 1 or Stage 2 reset.
- A reset occurs only when you hold the rest button while the module starts up. If you press the rest button during runtime, there is no effect.

WARNING: When you press the reset button while power is on, an Electric Arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.



Communication Options

Several communication networks are available for use with ControlLogix systems. This table describes typical network applications that are used with ControlLogix systems and lists the networks available to support such applications.

IMPORTANT There is no support for half-duplex communications on Ethernet at any speed.

Application Type	ControlLogix 5580 Controller - Supported Networks	ControlLogix 5570 Controller - Supported Networks
Communication options	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus™ (DH+™) • Remote I/O • SynchLink™ • USB Client	
Integrated Motion	EtherNet/IP	• EtherNet/IP • SERCOS interface • Analog options: – Encoder input – LDT input – SSI input
Integrated Motion on the EtherNet/IP network for time synchronization	EtherNet/IP	
Control of distributed I/O	• ControlNet • DeviceNet • EtherNet/IP • Foundation Fieldbus • HART • Universal remote I/O	
Produce/consume data between controllers	• ControlNet • EtherNet/IP	
Messaging to and from other devices, including access to the controller via Logix Designer application	• ControlNet • DeviceNet (only to devices) • Data Highway Plus™ (DH+) • DH-485 • EtherNet/IP	

Communication Throughput

With the multi-core environment of the ControlLogix 5580 controller, the communications task runs on a different core than the core the application code runs on. Unlike a ControlLogix 5570 controller, which shares its main core between application code and communications, the ControlLogix 5580 controller runs communications asynchronously from the user application.

This implementation provides better communications throughput in both the amount and speed of data the ControlLogix 5580 controller can deliver to and from, for example, HMIs, Historians, and MES systems. It also improves the overall application performance as the controller no longer has to task switch and pause application execution to handle HMI or other class 3 traffic.

Because the controller runs communications asynchronously to the application, it is important to make sure communications that are delivered to the controller are complete before the application executes on the newly delivered data. This applies to both data that comes into the controller and data that goes out.

For example, if the HMI is writing a large block of recipe data down to the controller, it is possible that application code could start executing on that recipe data before the data is completely written. This action results in half of the current recipe and half of the last recipe in the application space.

Traditionally, programmers have used several techniques to control the effects of asynchronous communications: UID/UIE pairs, Periodic tasks, and moving data with CPS instructions. These techniques all rely on controlling when the main core is allowed to switch tasks, thus preventing the communications task from changing data while the control task was using it. Because the ControlLogix 5580 controller performs communications processing on an independent core of the CPU, then UID/UIE pairs and Periodic Tasks are not as effective in all cases.

The items that are highlighted in this table are where ControlLogix 5570 and older controllers and the ControlLogix 5580 controller behavior differ.

Table 4 - ControlLogix 5570 and ControlLogix 5580 Controller Behavior Differences

Tag Read/Write Source	UID/UIE		CPS		Periodic Task	
	ControlLogix 5570	ControlLogix 5580	ControlLogix 5570	ControlLogix 5580	ControlLogix 5570	ControlLogix 5580
HMI	Blocks	Allows	Blocks	Blocks	Blocks	Allows
MSG	Blocks	Allows	Blocks	Blocks	Blocks	Allows
I/O Update	Allows	Allows	Blocks	Blocks	Allows	Allows
Produce/Consume	Allows	Allows	Blocks	Blocks	Allows	Allows
Other User Tasks	Blocks	Blocks	Blocks	Blocks	Allows	Allows
Motion Planner	Allows	Allows	Blocks	Blocks	Allows	Allows

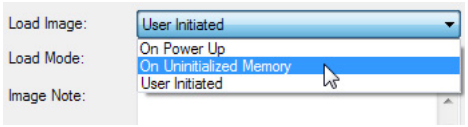
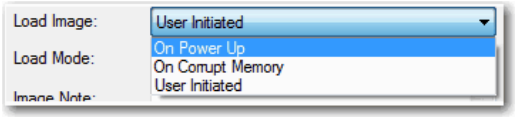
Blocks - Prevents source data values from change by communications during application execution.
Allows - Communications can change source data values during application execution.

Both ControlLogix 5570 and ControlLogix 5580 controllers have 32-bit data integrity, so this only applies to data structures larger than 32 bits.

SD Card Behavior

The ControlLogix 5580 controller has changed some behaviors when loading a project from the SD card into a controller. These changes facilitate a better workflow for easier commissioning of brand new out of box controllers. All Logix controllers ship from the factory with firmware revision 1.x.

The Load Image setting On Corrupt Memory is now called On Uninitialized Memory. The general behavior is the same as the original On Corrupt Memory setting. However, if the image on the SD card was saved with On Uninitialized Memory set, then when you use the SD card in an out of the box controller (revision 1.x firmware), at power-up the image loads both the controller firmware and controller application.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

When you use an SD card with an image in a brand new out-of-box controller (firmware revision 1.x), at power-up that controller updates its firmware to the revision stored on the card. The update happens regardless of the Load Image setting you made when you transferred the image to the SD card.

The On Power Up, and On Initialized Memory settings also load the controller application into an out of box controller.

This table shows what happens at power-up when you insert an SD card that contains an image into a ControlLogix 5580 controller.

Image Setting	Controller is in out-of-box condition (v1.x firmware)	Firmware > 1.x and internal non-volatile memory is not valid[2]	Firmware > 1.x and internal non-volatile memory is valid[2]
User Initiated	Loads Firmware Only[1]	Does Nothing	Does Nothing
On Power Up	Loads both Firmware and Application	• Loads Firmware if there is a revision mismatch • Loads Application	• Loads Firmware if there is a revision mismatch • Loads Application
On Uninitialized Memory	Loads both Firmware and Application[1]	• Loads Firmware if there is a revision mismatch • Loads Application	Does Nothing

(1) Indicates change in behavior from ControlLogix 5570 and older controllers.

(2) "Valid" includes th No Project condition.

Download the Program to the Controller

The first time that you download a program, it can take longer than subsequent downloads. These situations can affect download/compile times:

- The capability of the personal computer or laptop.
- You download the project immediately after a project import or upload, but before Logix Designer has compiled the project once.
- You edit a User Defined Tag (UDT), Add-On Instruction (AOI), or an object that is used in many places.
- Increased load when Logix Designer compiles and generates code.

The new Build button in Logix Designer creates binary files that are compiled from user subroutines, and caches them in the project .ACD file.

If these files are present in the project during a download, then Logix Designer does not have to recompile them, and saves time during the download process.

Every download requires that only the changed subroutines need to be recompiled. You can perform a build offline, save the project .ACD file, and later distribute it to many controllers without recompilation.

This manual build step is optional. If you do not use the build button, Logix Designer builds all necessary files when you initiate a download.

An imported project requires a complete rebuild, and extends the download process the first time you attempt a download.

Downloading Workflow Change on page 24 provides an explanation of the download changes for the ControlLogix 5580 controller.

Downloading Workflow Change

Offline builds can save time when doing subsequent downloads.

ControlLogix 5580 Example	ControlLogix 5570 Example
Only changed source code is recompiled on a download.	All projects had their source code recompiled on every download.

IMPORTANT Manually determine the impact to your application and correct accordingly.

Mitigation

Adjust your workflow to save workstations from having to rebuild the project. You can do offline builds, save the project file, and distribute it to other workstations to minimize your download times.

After mitigation, the download times are similar or much improved when compared to ControlLogix 5570 controllers.

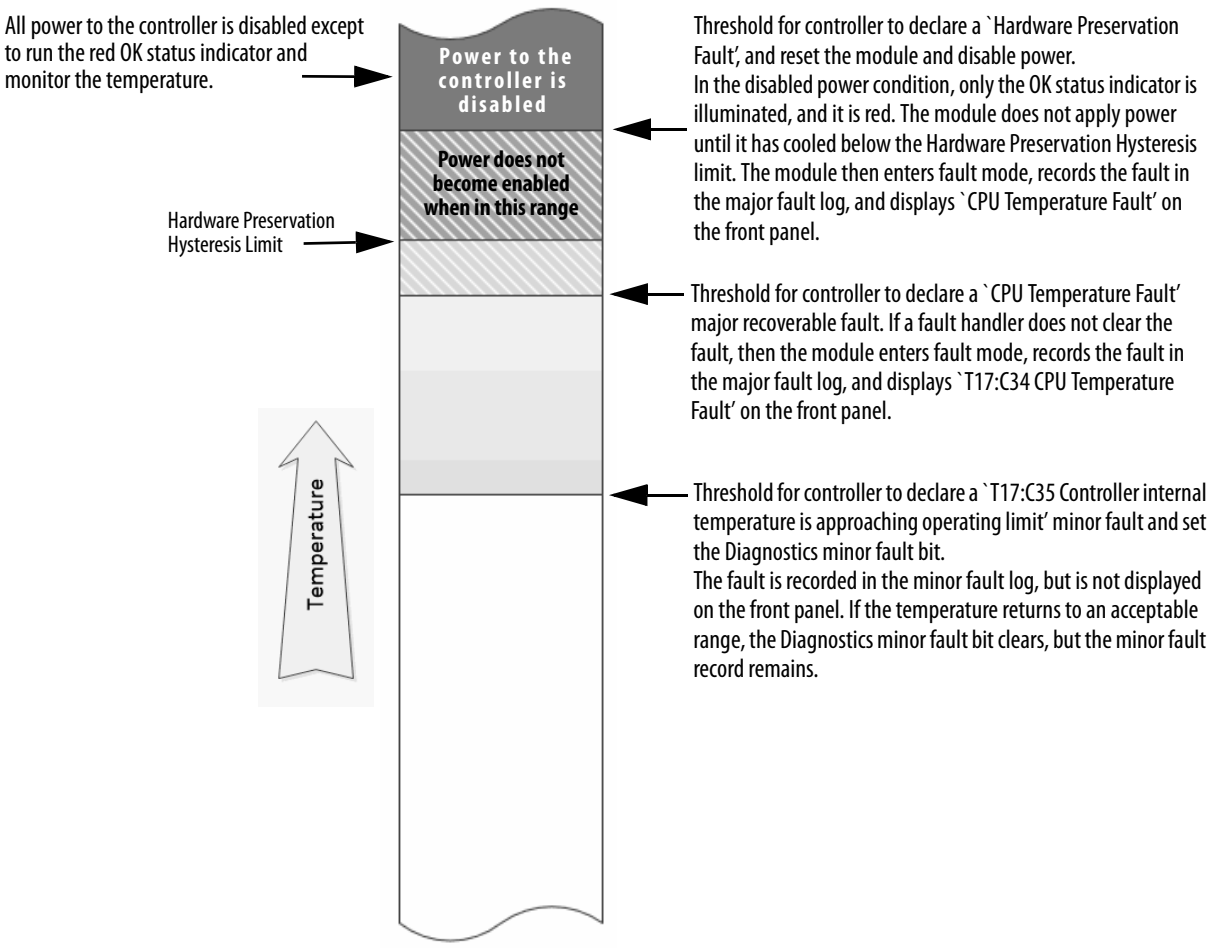
Upload Fidelity Change

When you upload, projects that contain program parameters and aliases now are faithfully reproduced. The uploaded RLL source code is an exact replica of what was downloaded. This was not the case in ControlLogix 5570 controller RLL subroutines, which referenced aliases or program parameters.

Thermal Monitoring and Thermal Fault Behavior

The ControlLogix 5580 controllers can monitor internal module temperatures and respond as the temperature increases.

Figure 7 - The ControlLogix 5580 Controller Thermal Fault Behavior



Notes:

Application Conversion

Converting Logix Designer Projects

When you open a pre-version 28 controller project ACD file in version 28, Logix Designer converts the project to a version 28 controller project. This conversion may not result in the most efficient use of internal memory structures.

To help optimize the internal memory structures, you can create a project by importing your pre-version 28 controller project from an ASCII .L5K or an XML .L5X file. You can also import rungs, routines, programs, equipment phases, user-defined types, tags, and Add-On Instructions into a version 28 project.

For information on how to import your project, see:

- Logix5000™ Controllers Import/Export Reference Manual, publication 1756-RM084.
- Logix5000 Controllers Import/Export Project Components Programming Manual, publication 1756-PM019.

Produce and Consume Tags

The following recommendations provide techniques for establishing produced or consumed tag communication between ControlLogix 5580 and earlier ControlLogix controllers.

RPI of Multicast Tags

Before Version 28, a produce tag produces data at the RPI of the fastest requesting consumer. This let multiple consumers with different RPIs successfully connect to a producer.

With Version 28, the first consumer of a produce tag determines the RPI at which data is produced. All subsequent consumers must request the same RPI value as the first consumer. Otherwise, the subsequent consumers fail to connect.

When migrating a pre-Version 28 project to Version 28, make sure that all pre-Version 28 multicast consumers of a produce tag are configured properly:

- For Version 17 and earlier consumers of a Version 28 ControlLogix 5880 controller producer, verify that all multicast consumed tags of a produced tag are configured with the same RPI. If they are not, then some of the consumers can fail to connect.
- For Version 18 to Version 28 multicast consumers of a Version 28 ControlLogix 5880 Controller producer, verify that;
  - All Version 18 to Version 28 multicast consumers of a produced tag are configured with the same RPI, or
  - All Version 18 to Version 28 consumers are configured to Allow Consumed Tags To Use RPI Provided By Consumer.

User-defined Data Structures

The ControlLogix 5580 controller requires 8-byte (64-bit) data types (LINTs) to be placed on 8-byte address boundaries in RAM. The Studio 5000 Logix Designer® Application manages this requirement automatically.

This change has no effect on individual LINT tags, but it does introduce potential changes to data structures (UDTs). In some cases, when LINTs inside a UDT would not be properly aligned, additional pad bytes are added to the data structure, which causes an increase in the UDT size.

You may need to adapt your project to accommodate larger structure sizes. You can see the following effects due to the larger size:

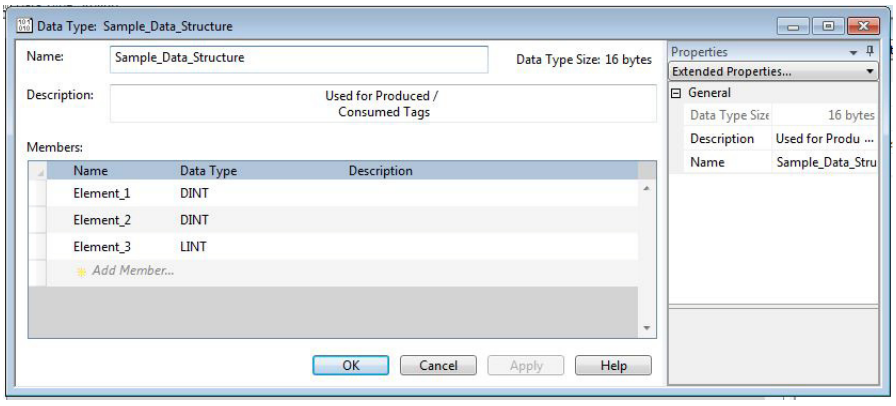
- Message instruction data lengths may need to change to complete successfully.
- Copy lengths of data structures can change.
- Produce/Consume connections to other Logix controller types may have data type mismatches and may need to change to complete successfully.

To correct Produce/Consume errors that are caused by UDT alignment changes, modify the tag structures in both projects so that they match.

- Produce/Consume with Status requires an exact match of the UDT definition (including the name of the UDT definition).
- Produce/Consume without Status requires the Size of the UDT to match.

The most reliable method to cover both of these cases is to copy and paste the UDT definition from one project to the other. Use the Data Type editor to check the Data Type Size in both projects:

Figure 8 - Data Type Editor



If the Data Type Size is different in the two projects, then modify the UDT to produce the same internal data structure in both the ControlLogix 5580 project and the ControlLogix 5560/5570 project. The following section describes the data alignment rules in more detail.

Data Structures

ControlLogix 5580 controllers impose these new data alignment rules on user-defined data types (UDTs):

- UDTs that have no 8-byte elements retain the existing 4-byte memory allocation rules.
- UDTs that contain LINTs are considered to be 8-byte data types and their size is a multiple of 8 bytes.
- 8-byte data types (LINTs or embedded UDTs) within a data structure are aligned on an 8-byte boundary.

The following sample UDT illustrates how the 8-byte allocation rule and the 8-byte alignment rule would cause a UDT to have a different size in a ControlLogix 5580 project compared to a ControlLogix 5570 project:

Figure 9 - UDT Sample - Needs Additional Memory Allocation and Alignment for the ControlLogix 5580 Controller

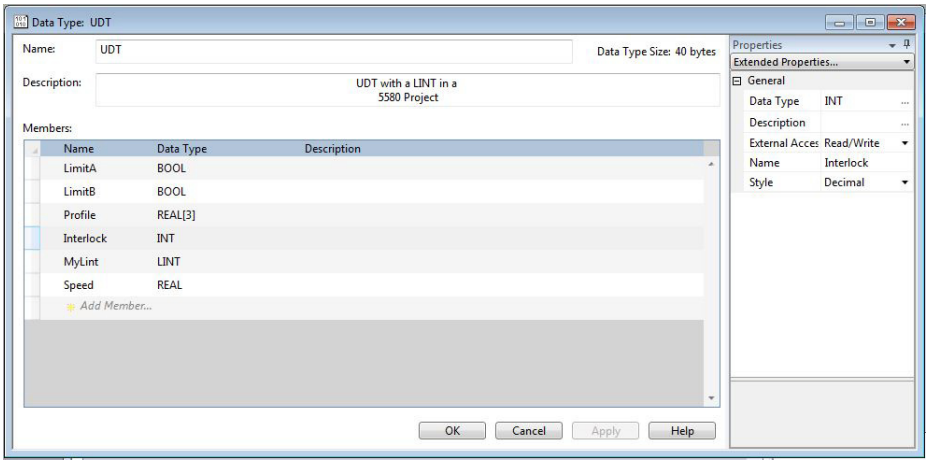


Table 5 illustrates how this data structure would map in a ControlLogix 5570 project; note that MyLint is split across two 64-bit words, and the total size is only 32 bytes.

Table 5 - Data Structure for a ControlLogix 5570 Project

Word	Elements	Byte Mapping Table				64 Bit Boundaries
0	LimitA and LimitB	Pad	Pad	Pad	Hidden SINT	0
1	Profile (Real [3])	Map	Map	Map	Map	
2		Map	Map	Map	Map	1
3		Map	Map	Map	Map	
4	Interlock (Int)	Pad	Pad	Map	Map	2
5	MyLint (LINT)	Map	Map	Map	Map	
6		Map	Map	Map	Map	3
7	Speed (REAL)	Map	Map	Map	Map	

Table 6 illustrates the hidden padding bytes automatically added by Logix Designer to achieve the 8-byte alignment and allocation rules for a ControlLogix 5580 project:

- Padding is added in Word 5 so that MyLint starts at an 8-byte boundary
- Padding is added in Word 9 so that the entire structure is a multiple of 8 bytes.

Table 6 - Hidden Padding Added for ControlLogix 5580 Projects

Word	Elements	Byte Mapping Table				64 Bit Boundaries
0	LimitA and LimitB	Pad	Pad	Pad	Hidden SINT	0
1	Profile (Real [3])	Map	Map	Map	Map	
2		Map	Map	Map	Map	1
3		Map	Map	Map	Map	
4	Interlock (Int)	Pad	Pad	Map	Map	2
5	Padding for 8-byte alignment	Pad	Pad	Pad	Pad	
6	MyLint (LINT)	Map	Map	Map	Map	3
7		Map	Map	Map	Map	
8	Speed (REAL)	Map	Map	Map	Map	4
9	Padding for 8-byte allocation	Pad	Pad	Pad	Pad	

To create a UDT that is the same size in all types of projects, insert additional data elements so that hidden padding bytes are not necessary.

The following sample UDT illustrates how UnusedDint1 and UnusedDint2 were added to create a UDT with the same size in a ControlLogix 5580 project and a ControlLogix 5570 project:

Figure 10 - UDT Sample - Memory Allocation and Alignment OK for the ControlLogix 5580 and ControlLogix 5570 Controllers

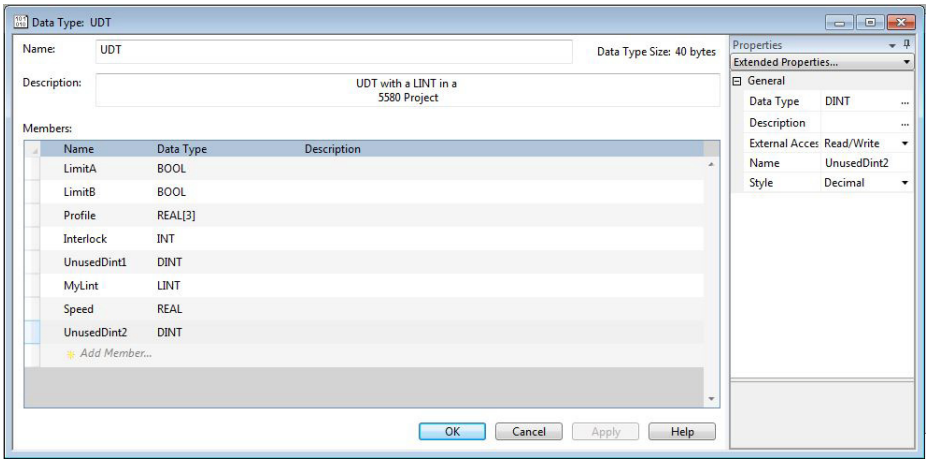


Table 7 illustrates how this data structure would map in all types of Logix projects:

Table 7 - Memory Map in All Project Types

Word	Elements	Byte Mapping Table				64 Bit Boundaries
0	Bools and 2	Pad	Pad	Pad	Hidden SINT	0
1	Profile (Real [3])	Map	Map	Map	Map	
2		Map	Map	Map	Map	1
3		Map	Map	Map	Map	
4	Interlock (Int)	Pad	Pad	Map	Map	2
5	UnusedDint1	Map	Map	Map	Map	
6	MyLint (LINT)	Map	Map	Map	Map	3
7		Map	Map	Map	Map	
8	Speed (REAL)	Map	Map	Map	Map	4
9	UnusedDint2	Map	Map	Map	Map	

The concept is the same for nested UDTs. If the lower-level UDT is an 8-byte type (that is, it contains at least one 8-byte data element), you must align it to start at an 8-byte boundary.

To correct any mis-matched UDTs, perform the following procedure (in either project):

1. Start at the deepest nesting level of any multi-level UDT.
2. Work from the beginning of each structure and look for LINT data types.
3. For each LINT datatype or 8-byte UDT encountered, map out the sizes of the prior UDT elements, to determine the byte offset at the start of the element.

   See Data Structures on page 29 and Structural Changes to Execution on page 41 for more information.

   If the byte offset for the first 8-byte element is not divisible by 8 bytes (64 bits), insert a DINT tag element just above the 8-byte element. You can use any name that you choose. Instructions do not need to reference this element.
4. Repeat the process until all 8-byte elements are aligned on 8-byte (64-bit) boundaries.
5. If needed, add a DINT at the end of the UDT to satisfy the 8-byte allocation rule.
6. Continue up through nested UDTs until the top level is correct.

When you are complete, the size of the UDTs are the same in both the ControlLogix 5580 project and the ControlLogix 5570 or earlier project. You can use the padded UDTs in both the ControlLogix 5580 project and the ControlLogix 5570 or earlier project.

A useful technique when creating UDTs is to start with the largest data types first, and work down through 8-byte, 4-byte, 2-byte, 1-byte, and finally single-bit data types. The resultant mapping is 64-bit-aligned in all controller types, so no manual padding would be required.

Produce/Consume with Status requires an adjustment to this technique. For these cases, the UDT must start with a 4-byte 'COMMAND_STATUS' element; therefore, one more 4-byte element (DINT or REAL) must be added before placing any 8-byte elements.

Motion Applications

The ControlLogix 5580 controllers support up to 256 axes of integrated motion. The 256 axes can be any combination of CIP, Virtual, and Consumed axes. You can add all axes to one Motion Group, and you can assign any combination of axes to different axis update schedules.

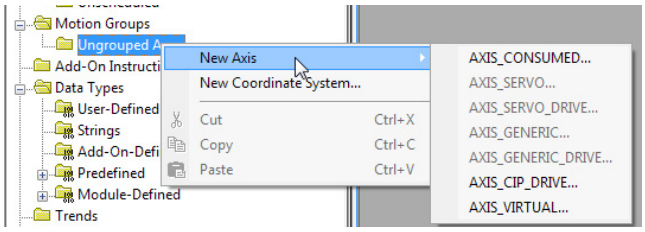
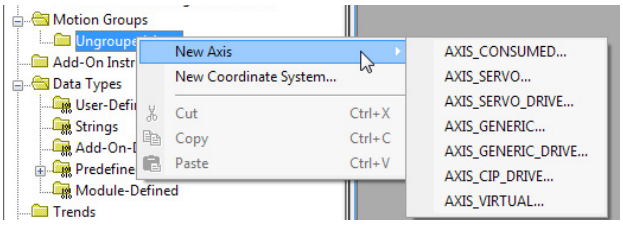
The ControlLogix 5580 controllers do not support Analog or SERCOS motion.

Motion Networks	ControlLogix 5580 Controller	ControlLogix 5570 Controller
EtherNet/IP	Yes	Yes
Analog Motion	No	Yes
SERCOS	No	Yes

TIP Rockwell Automation recommends using the built-in EtherNet/IP port for high-performance motion applications.

You can associate Integrated Motion axes to any appropriate drive, regardless of whether the communications path to the drive is via the embedded Ethernet port, or over the 1756 backplane through an Ethernet bridge.

Table 8 - New Axis Menu for the ControlLogix 5580 Controllers

ControlLogix 5580 Example	ControlLogix 5570 Example
	

See the Integrated Motion on the EtherNet/IP Network User Manual, publication MOTION-UM003 for complete information on axis limits and scheduling.

Pending Edits

Online edits now help customers avoid unintentionally leaving routines in an inconsistent state. Accept Pending Edits is now blocked if any pending edits have verification errors

This implementation affects all instructions in the instruction set.

Language	Affected
Ladder Logic (RLL)	yes
Structured Text (ST)	yes
Function Blocks (FBD)	yes
Sequential Function Chart (SFC)	yes

ControlLogix 5580 Example	ControlLogix 5570 Example
If you edit multiple rungs and select Accept Pending Edits, Logix Designer does the following. • Accepts all rungs if there are no verification errors. • Accepts none of the rungs if errors occur.	Individual Pending Edits can be accepted and downloaded to controller, while edits that error out are not downloaded to the controller.

IMPORTANT Manually determine the impact to your application and correct accordingly.

Mitigation

N/A

Notes:

Instruction Execution

This section describes the changes in instructions for the ControlLogix® 5580 controllers.

Math-related Instructions

This section describes the changes in math-related instructions for the ControlLogix 5580 controllers. There are comparisons between the ControlLogix 5570 controllers behavior and ControlLogix 5580 controller behavior.

IMPORTANT Manually determine the impact to your application and correct accordingly.

TRN Instruction Changes

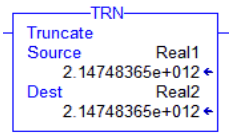
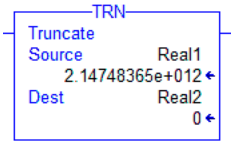
Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

Previously, truncating a large real number could overflow internal math that is performed by the instruction and return a zero (0). Some large reals that failed and returned a zero when truncated now return a value.

In RLL, S:V is set properly when the value that is truncated is too large to be stored in the destination.

With this implementation, the truncation of real values to real destinations is more likely to complete without errors.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

Modify any existing code that relied on obtaining a zero result instead of range-checking the input value.

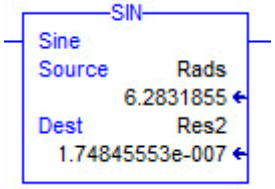
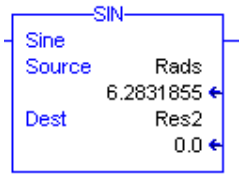
Improved Math Instruction Accuracy

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

The implementation changed from a polynomial algorithm to an industry standard algorithm. The algorithm change, along with hardware improvements, help to improve overall accuracy for ControlLogix 5580 controllers.

This implementation affects these instructions: ACS/ACOS, ASN/ASIN, ATN/ATAN, COS, LN, LOG, SIN, SQR, TAN, XPY.

ControlLogix 5580 Example	ControlLogix 5570 Example
 Since 2*PI is an estimated value for Rads, the result does not equal 0.0.	

Mitigation

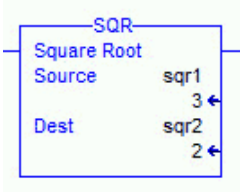
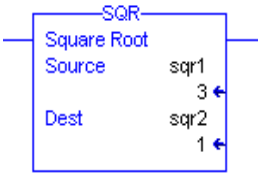
Reverify any existing code that expects an exact result whenever the input is close to values that produce zero, infinity, or asymptotic results.

SQR/SQRT Adjustment

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes

The SQR/SQRT instruction now uses round-to-even type conversion of the floating point result to integer destination. Previously, this operation truncated the floating point result.

This implementation can help to get a more standard behavior out of SQR to better match the IEC standard math expectations.

ControlLogix 5580 Example	ControlLogix 5570 Example
 Source - DINT Dest - DINT	 Source - DINT Dest - DINT

Mitigation

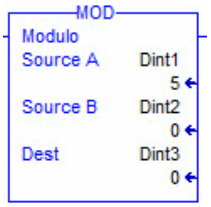
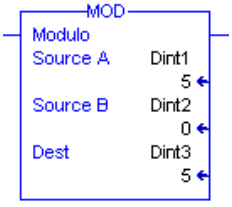
N/A

X Mod 0

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	No

This instruction was updated to conform to IEC 61131-3 ed. 2 table 28 for MOD function. In this case, anything Mod 0 results in 0.

This implementation affects the MOD instruction.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

N/A

AND, NOT, OR, and XOR Support for REAL

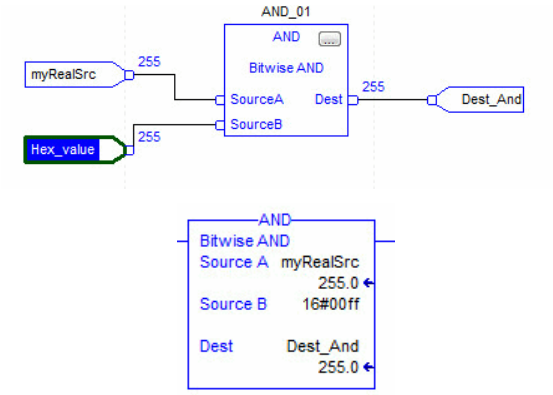
Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

The verification rules for these instructions now allow REAL operands to be used in RLL routines that are based on existing behavior in non-RLL languages.

This implementation helps to make programming for these instructions consistent across all languages.

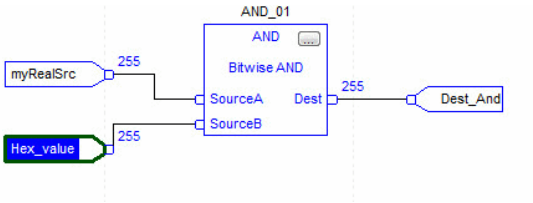
ControlLogix 5580 Example

Also supported in RLL.

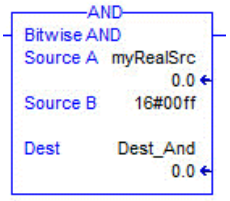


ControlLogix 5570 Example

Bitwise arithmetic operations for reals only in FBD.



When used in RLL, you get this error: Invalid Data Type. Argument must match parameter data type.




```
Error: Rung 4, AND, Operand 0: Invalid data type. Argument must match parameter data type.
Error: Rung 4, AND, Operand 2: Invalid data type. Argument must match parameter data type.
```

Mitigation

N/A

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes(1)
Sequential Function Chart (SFC)	Yes(2)

(1) MEQ instruction only.

(2) Only affects embedded Structured Text.

Floating Point Literals

The programming software now detects invalid parameter values. This helps to prevent you from accidentally specifying invalid values to certain instructions.

This implementation affects these instructions: MAG, MAJ, MAM, MAPC, MEQ.

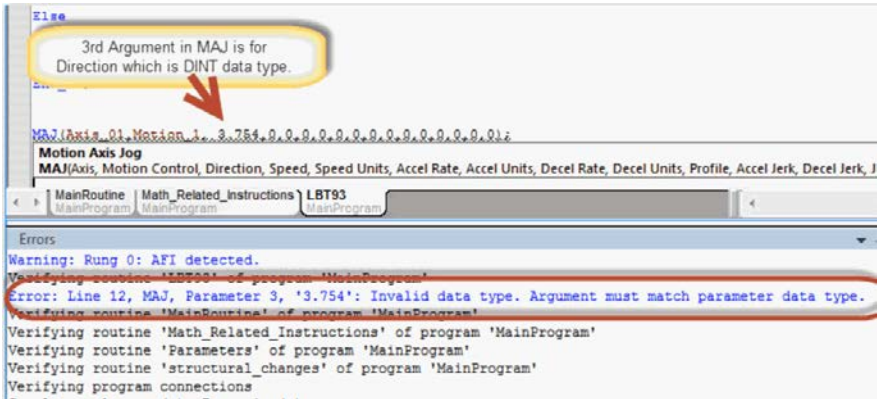
ControlLogix 5580 Example

If an instruction only verifies with tags of type DINT, it also only verifies with literal values that are Integers.

MEQ: Error during Controller Verification: Invalid Data Type.
Argument must match parameter data type.

```
Verifying routine 'MainRoutine' of program 'MainProgram'
Verifying routine 'Math_Related_Instructions' of program 'MainProgram'
Error: Rung 6, MEQ, Operand 1: Invalid data type. Argument must match parameter data type.
Verifying program connections.
```

MAJ in Structured Text
When you specify a floating literal for the Direction argument (which is a DINT), you get the following error.




```
Verifying routine 'MainRoutine' of program 'MainProgram'
Verifying routine 'Math_Related_Instructions' of program 'MainProgram'
Error: Rung 6, MEQ, Operand 1: Invalid data type. Argument must match parameter data type.
Verifying program connections.
```

ControlLogix 5570 Example

The following instruction is valid, even though it fails verification if a tag of type REAL was used for Mask.

MEQ
Source: DINT_Tag_1
Mask: 12.35
Compare: DINT_Tag_2

Mitigation

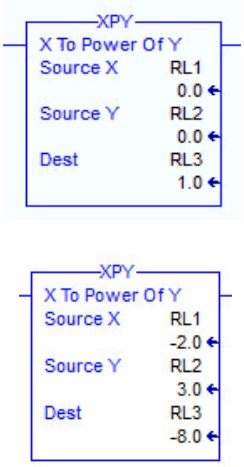
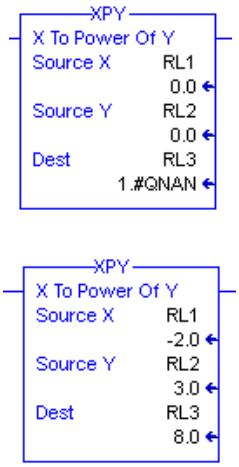
Resolve any verification errors that occur when you open and import projects in version 28.

XPY Instruction

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

This implementation matches the industry standard behavior for raising X to the power of Y.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

N/A

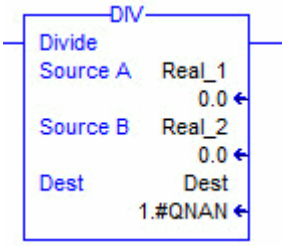
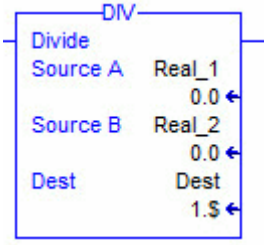
0.0 div 0.0

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

The special case of a floating point divide of zero by zero now results in a NAN value. Legacy controllers produced infinity.

This implementation affects the DIV instruction.

ControlLogix 5580 Example	ControlLogix 5570 Example
DIV(0.0, 0.0, dest) now produces NAN.	DIV(0.0, 0.0, dest) used to produce infinity.
	

Mitigation

Inspect your applications for the Divide operation and correct accordingly.

Structural Changes to Execution

This section describes the structural changes to execution that have been implemented for the ControlLogix 5580 controller in comparison to the ControlLogix 5570 controller.

IMPORTANT Manually determine the impact to your application and correct accordingly.

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

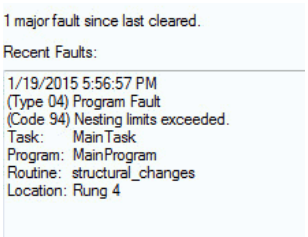
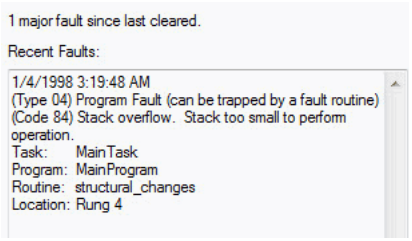
(1) Only affects embedded Structured Text.

JSR Nesting Level Limit

When you nest routines, the controller reserves enough memory to execute to a maximum of 25 nesting levels. Previously, controllers let you continue to nest until they ran out of stack space and faulted.

The major fault 'Nesting limits exceeded' signifies that you have exceeded the nesting limit.

This implementation affects the JSR instruction.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

Restructure your project to avoid excessive subroutine nesting. Resolve any verification errors that occur when you open and import projects in version 28.

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

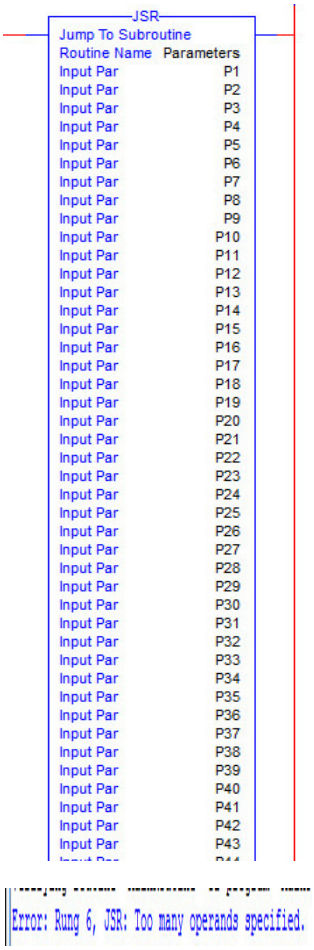
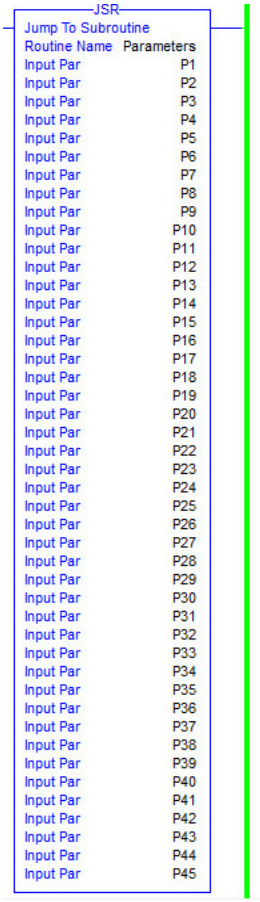
(1) Only affects embedded Structured Text.

Max number of inputs or outputs for a program JSR/RET

JSR calls are now limited to 40 input parameters and 40 output parameters. With this limit, the controller is less likely to run out of memory at runtime. If you exceed this limit you get a verification error.

Previously, there was no limit on the number of parameters you could define as an input or output parameter. This could cause the controller to run out of stack space at runtime and fault.

This implementation affects these instructions: JSR, RET, SBR.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

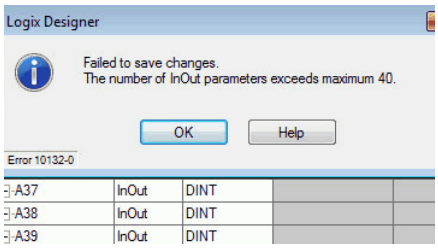
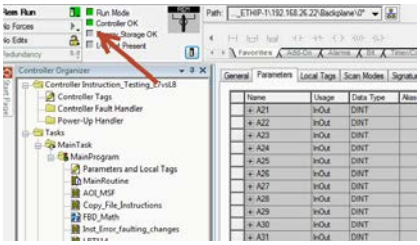
Mitigation

Resolve any verification errors that occur when you open and import projects in version 28.

Max Number of InOut Parameters for an Add-On Instruction

When an Add-On Instruction is called, you can only pass 40 InOut parameters into/out of the Add-On Instruction. If you exceed this limit you get a verification error. There is no imposed limit on inputs or output parameters.

Previously, there was no limit on the number of InOut parameters you could define for an Add-On Instruction. This could cause the controller to run out of memory space at runtime and fault.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

Resolve any verification errors that occur when you open and import projects in version 28.

Add-On Instruction Nesting Level Limit

When nesting Add-On Instructions, you are limited to a maximum of 25 levels. The controller has reserved enough memory to execute to that nesting level. Previously, controllers let you continue to nest until they ran out of memory and faulted.

Now, the memory profile is more balanced across the user application and avoids memory being exhausted due to spikes in consumption.

The major fault 'Nesting limits exceeded' signifies that you have exceeded the nesting limit.

ControlLogix 5580 Example	ControlLogix 5570 Example
When nesting Add-On Instructions, the nesting limit is a maximum of 25 levels.	Previously, controllers let you continue to nest until they ran out of stack space and faulted.

Mitigation

Resolve any verification errors that occur when you open and import projects in version 28.

Jump to Label Must Be Present

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

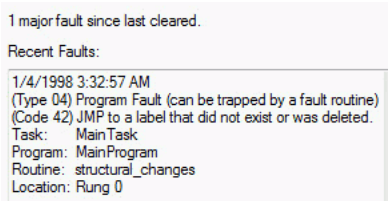
Previously, a jump to label request could reference a label that did not exist and cause a fault. The ControlLogix 5580 controllers now require the label to exist before:

- You download the project to the controller if you are working offline.
- You accept edits if you are working online.

Project verification now detects missing LBLs to help lower the risk of unexpected runtime faults.

```
ing routine 'MainRoutine' of program 'MainProgram'
 Rung 1, JMP: JMP instruction has no target label (Label_1).
ing program connections
```

This implementation affects these instructions: JMP, LBL.

ControlLogix 5580 Example	ControlLogix 5570 Example
The ControlLogix 5580 controllers now require the label to exist before: • Downloading if working offline. • Accepting edits if working online. 	Missing LBLs are not detected until the corresponding JMPs are executed; depending on input logic, the project can appear to run OK until conditions trigger a JMP to a missing target. 

Mitigation

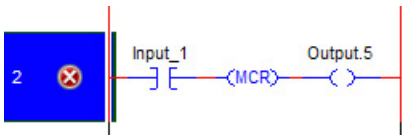
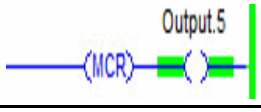
Resolve any verification errors that occur when you open and import projects in version 28.

MCR Placement

Language	Affected
Function Blocks (FBD)	No
Ladder Logic (RLL)	Yes
Sequential Function Chart (SFC)	No
Structured Text (ST)	No

The MCR instruction must be the last instruction on any rung. Otherwise, the project generates an error upon verification.

```
Error: Rung 2, MCR: MCR instruction must be last instruction on rung.
```

ControlLogix 5580 Example	ControlLogix 5570 Example
Project generates error on verification. 	No error shown, however it is difficult for programmers to know how the MCR might affect any instructions following it on the rung. 

Mitigation

N/A

Data Alignment and Memory Allocation Rules for User-defined Data Types (UDTs) that contain LINTs

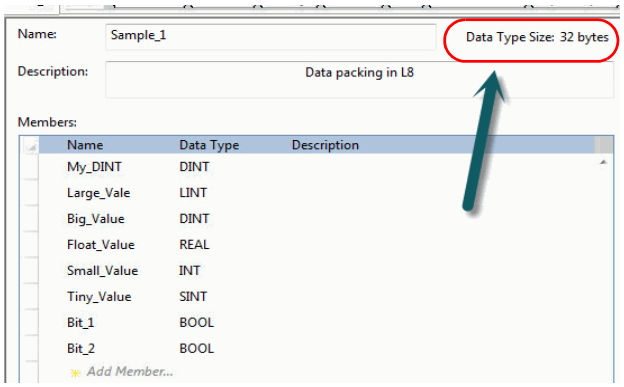
Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes

LINT data types are now aligned on 64-bit boundaries in ControlLogix 5580 controllers. UDTs that contain LINTs allocate memory in multiples of 8 bytes. In ControlLogix 5570 or earlier controllers, alignment and allocation used 4-byte boundaries. Proper alignment of data improves data integrity and performance.

This implementation affects UDTs that contain LINT data types (including LINTs in nested UDTs).

ControlLogix 5580 Example

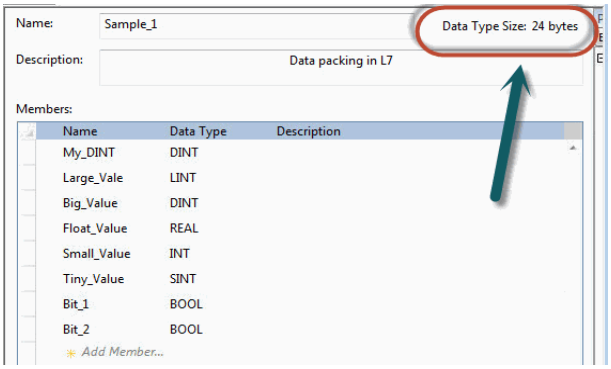
Data Type Size - 32 bytes



Word	Elements	5580 - 64 Bit Boundary				
		Data Type	Mapping Table (8 bits each column			
0	My_DINT	DINT	MAP	MAP	MAP	MAP
1	Padding Bytes		PAD	PAD	PAD	PAD
2	Large_Value	LINT	MAP	MAP	MAP	MAP
3			MAP	MAP	MAP	MAP
4	Big_Value	DINT	MAP	MAP	MAP	MAP
5	Float_Value	REAL	MAP	MAP	MAP	MAP
6	Small_Value Tiny_Value, Bit 1 Bit_2	INT, SINT, BOOL, BOOL	MAP	MAP	MAP	MAP
7	Padding Bytes		PAD	PAD	PAD	PAD

ControlLogix 5570 Example

Data Type Size - 24 bytes



Word	Elements	5570 - 32 Bit Boundary				
		Data Type	Mapping Table (8 bits each column			
0	My_DINT	DINT	MAP	MAP	MAP	MAP
1	Large_Value	LINT	MAP	MAP	MAP	MAP
2			MAP	MAP	MAP	MAP
3	Big_Value	DINT	MAP	MAP	MAP	MAP
4	Float_Value	REAL	MAP	MAP	MAP	MAP
5	Small_Value Tiny_Value, Bit 1 Bit_2	INT, SINT, BOOL, BOOL	MAP	MAP	MAP	MAP

Mitigation

If you Produce/Consume tags in UDTs between the ControlLogix 5570 and the ControlLogix 5580 controllers, see Produce and Consume Tags on page 27. For more information about mapping, see User-defined Data Structures on page 28.

If you are using COP or CPS instructions to move data between UDT-based tags and simple arrays, then review your logic to make sure that the COP/CPS instructions are of the correct length, and the logic matches the position of the data within the array.

For example, using a CPS instruction to copy a SINT[32] array obtained from an external device into a UDT that contains LINTs

Instruction Error and Fault Changes

This section describes the instruction error and fault changes that have been implemented for the ControlLogix 5580 controller in comparison to the ControlLogix 5570 controller.

IMPORTANT Manually determine the impact to your application and correct accordingly.

Subscript expressions

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes(1)
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

(1) Structured Text does not update math flags but REALs in the expression and the major fault is not allowed if the calculated index is out of range will affect ST.

Subscript expressions are treated separately from instructions. If an overflow occurs during their evaluation, then the overflow can be recorded as a minor overflow fault but always generates a major fault to indicate an out of range condition.

Subscript expressions behave much more predictably:

- REAL operands/operators are no longer allowed.
- Calculation of subscript expressions no longer silently produces invalid results.
- Overflow conditions are detected and produce a Major Recoverable Fault.

ControlLogix 5580 Example	ControlLogix 5570 Example
In ControlLogix 5580 controllers, math errors in subscript calculations do not impact math status flags in any way. Overflow minor faults for subscript expressions are reported if enabled. A major fault will be generated if an overflow occurs to indicate the index was not computed normally.	In ControlLogix 5570 controllers, a subscript calculation changes the value of a math status flag making it impossible to identify if the actual error was caused by the instructions or evaluation of a subscript expression used with the instruction during operand address processing.

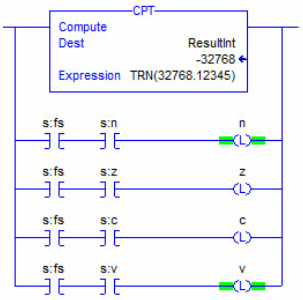
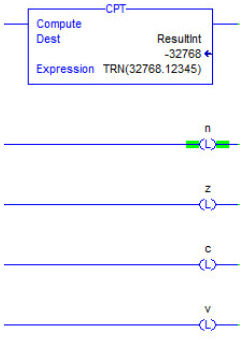
Mitigation

Review all subscript expressions in your application to make sure they cannot produce an overflow result, for example, a divide-by-zero. Update any major fault recovery logic in your application to handle this new fault appropriately.

TRN Operator and Math Status Flags

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

TRN operators always produce a 32-bit integer value. When attempting to store that value into a destination too small to hold it, an overflow condition occurs. While the ControlLogix 5570 causes a minor overflow fault, it did not set the overflow flag. CPT instructions that use a TRN operator now produce correct math status.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

N/A

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

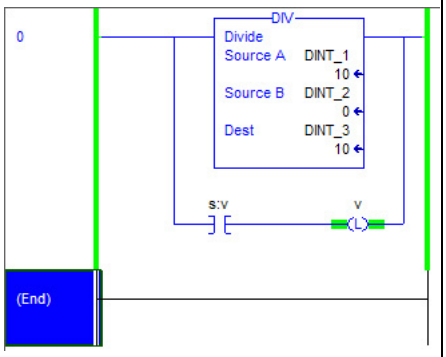
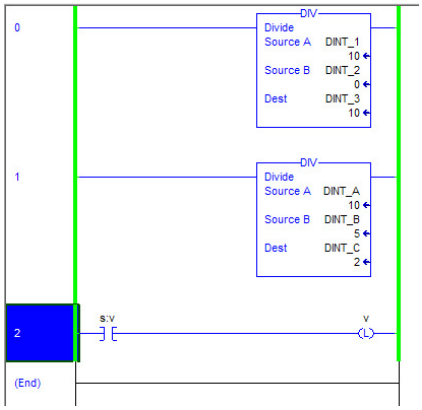
Math Status Flags are valid only in one rung

On ControlLogix 5570 controllers, the math status flag reflected any math event that occurred anywhere in the routine that did the evaluation. The ability to identify the instruction that caused the error was a challenge. Also, other instructions that executed correctly after the offending instruction could clear any math status flag errors.

In ControlLogix 5580 controllers, the math status flag must reside after an instruction that can set the math status flag. The math status flag reflects the math status that occurred only on the previous instruction that can set the flag within this rung.

This removes the ambiguity as to which instruction caused the math status flag result. The controller does not waste CPU time generating math status flag values if they are not examined.

This implementation affects all math status producer/consumer instructions.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

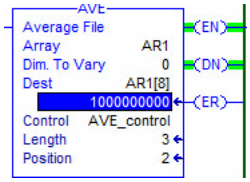
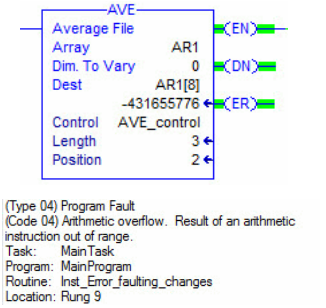
Mitigation

Rearrange logic that evaluates math status flags so that the logic is on the same rung as the flag-generating instruction, and there are no intervening instructions that could affect the flags.

AVE and STD instruction accuracy

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

The internal data type used for internal calculations of AVE and STD instruction now has greater precision. This improves the accuracy of the results that are generated by the AVE and STD instructions.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

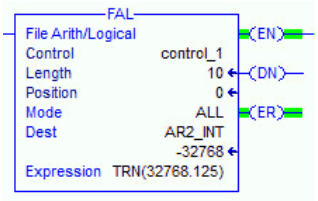
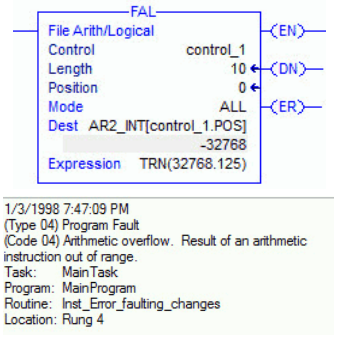
N/A

BTD, FAL, FSC, and CMP no longer generate math status

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

The BTD, FAL, FSC, and CMP instructions no longer impact math status flags (S:Z, S:N, S:V) since they do not write a value to a discrete destination. If the minor overflow reporting feature is enabled, BTD, FSC, and CMP instructions report this kind of fault. The FAL no longer generates a minor fault on overflow since the ER bit is set and the operation is aborted.

This removes the expectation that math status has a value for BTD, FAL, FSC, and CMP instructions.

ControlLogix 5580 Example	ControlLogix 5570 Example
	There are several situations where math status flags are generated but the user cannot determine exactly where. One case is with the FAL instruction, if the expression is re-iterated 10 times, you cannot tell which iteration may have caused the flag. 

Mitigation

N/A

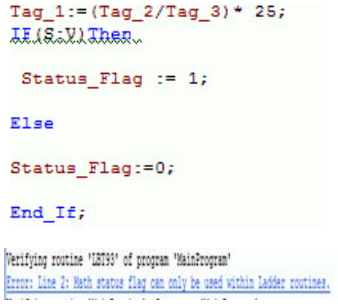
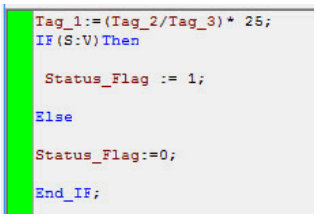
Language	Affected
Ladder Logic (RLL)	No
Structured Text (ST)	Yes
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	Yes[1]

(1) Only affects embedded Structured Text.

Math Status Flags not allowed in Structured Text

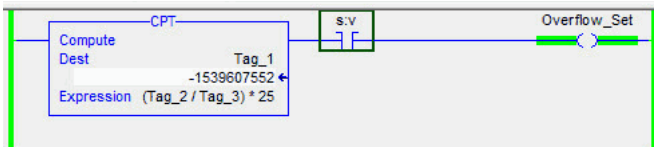
Math status flags are no longer allowed in structured text. Use of math status flags in structured text fails verification.

This implementation affects all math status producer/consumer instructions.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

Move legacy ST code into an Add-On Instruction that contains equivalent RLL code to emulate math status behavior. Also use Add-On Instruction output parameters to return math status flag-specific values for client to test.




```
STX_Example(STX_AOI,1,Tag_2,Tag_3);
Overflow := STX_AOI.Overflow_Set;
```

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

Minor Fault on Overflow

The generation of overflow minor faults is now user-selectable. Report Overflow Faults is a new parameter that lets you enable Minor Overflow fault reporting.

Report Overflow Faults appears on the Controller Properties Advanced Tab:

- If you convert a legacy project to a ControlLogix 5580 project, this parameter defaults to enabled to keep legacy behavior.
- If you create a new ControlLogix 5580 project, this parameter defaults to disabled to improve performance.
- In either case, you can override the default by changing the check box in the Controller Properties Advanced tab.

Not monitoring overflow events in the minor fault log can reduce controller overhead.

This implementation affects all instructions that can overflow.

ControlLogix 5580 Example	ControlLogix 5570 Example
The ControlLogix 5580 controller by default does NOT trigger a minor fault. • If you were expecting a minor fault condition that you need to monitor, use the S:V math status flag following candidate instructions. • If you want to monitor all overflow minor faults, then enable the Report Overflow Faults property on the controller Advanced tab.	In ControlLogix 5570 controllers, the controller always triggered a minor fault condition when a math overflow occurred.

Mitigation

If you want to monitor overflow conditions for specific instructions capable of generating a minor overflow fault, insert XIC(S:V) immediately following each instruction.

If you want to monitor all possible minor overflow conditions, set Report Overflow Faults on the Controller Properties Advanced Tab and check the minor fault log for their occurrence.

ATTENTION: Enabling Report Overflow Faults may slow down your program scan times.

Manually Set Math Overflow

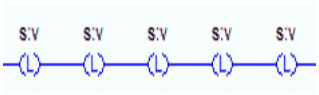
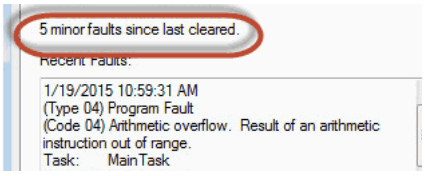
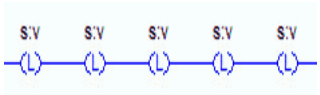
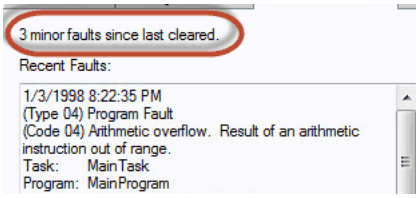
Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

You can use overflow flags to help debug your code. Create math overflow conditions where appropriate in your code.

With the ControlLogix 5570 controller, if you used an OTE or OTL instruction to set the overflow flag (S:V), the instruction did not always generate a minor fault in the controller.

With the ControlLogix 5580 controller, when you use an OTE or OTL instruction to set the overflow flag (S:V), the instruction causes an overflow minor fault in the controller regardless of the state of the flag before the instruction was executed.

This implementation affects the OTE and OTL instructions.

ControlLogix 5580 Example	ControlLogix 5570 Example
 	 

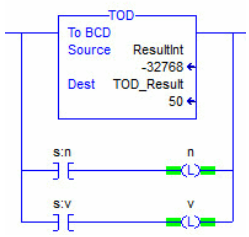
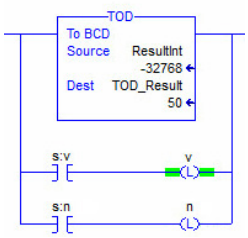
Mitigation

N/A

TOD instruction flags and math status flags

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

This implementation sets math status flags in a consistent manner across instructions, and offers more complete math status flags for the TOD instruction.

ControlLogix 5580 Example	ControlLogix 5570 Example
In the ControlLogix 5580 controller, a TOD instruction can modify the math status flags S:V, S:N, and S:Z.	In the ControlLogix 5570 controller, the TOD instruction only populated the math overflow condition S:V.
	

Mitigation

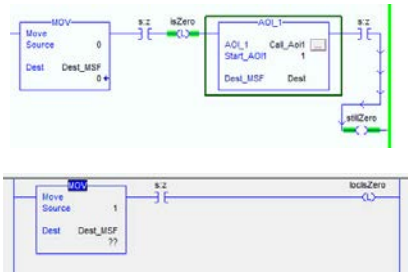
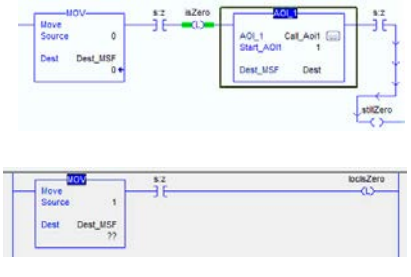
N/A

Add-On Instructions Do Not Propagate Math Status Flags

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

When the content of an Add-On Instruction generates a math status flag, the status is not propagated to the routine or other Add-On Instructions that call the offending Add-On Instruction. Add-On Instructions are not considered producers of Math Status Flags. Math status flags can be evaluated in the Add-On Instruction, but not by the caller.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

If you want the Add-On Instruction to return math status flags, then use boolean output parameters.

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	Yes(1)

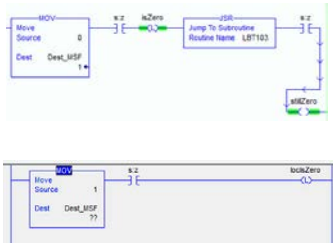
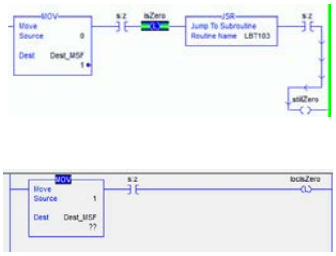
(1) Only affects embedded Structured Text.

Subroutines do not Affect Math Status Flags

Subroutines are not considered MSF producers, so they do not preserve math status flags across calls. The JSR, SBR, RET, FOR, BRK instructions are not math status flags producers. FOR and BRK do not affect math status flags since they do not pass any parameters.

The JSR instruction saves (and reinitializes) the flags on entry and restores them after the subroutine returns. Also, the SBR, RET, FOR, and BRK instructions do not change the flags.

This implementation affects the JSR and FOR instructions. FOR is only available in RLL.

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

N/A

Carry Flag

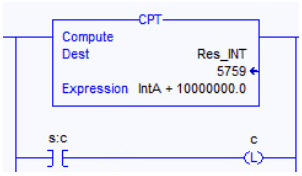
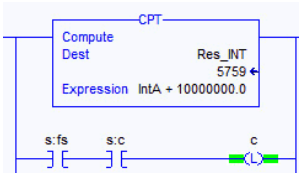
Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects embedded Structured Text.

Only the ADD and SUB instructions that specify integer operands can affect the carry bit. This lets you can chain calculations to support larger (unsupported) data types (Add low, Add_with_carry high).

The carry flag is limited to only those operations that are relevant. This simplifies its use and that of math status flags in general.

This implementation affects all instructions that can set math status flags.

ControlLogix 5580 Example	ControlLogix 5570 Example
ControlLogix 5580 Behavior Using ADD and SUB operators have no effect on the carry bit. Now only ADD and SUB instructions with integer operands can affect the Carry flag. 	Many math instructions could set the Carry bit. 

Mitigation

Look for references to s:c in the user project and verify that the logic functions as intended.

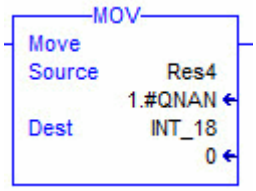
Store NAN in an Integer

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

(1) Only affects the embedded Structured Text.

ControlLogix 5580 controllers now offer standardized results when writing/propagating NAN values.

This implementation affects all instructions that can produce a Floating Point value and store in an integer location.

ControlLogix 5580 Example	ControlLogix 5570 Example
Writing +/- NAN to an integer always results in the value 0 be stored. 	Writing NAN to an integer results in either -1 or 0 depending on the sign bit for NAN. 

Mitigation

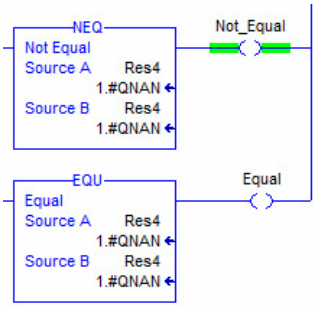
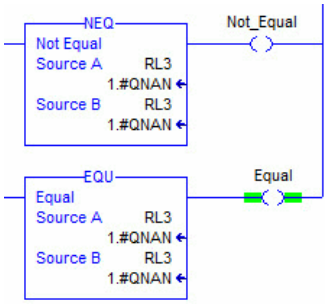
Revise your application if it was checking for the special value of '-1' to indicate a '-NAN' result.

Compare NAN Values

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	No

NAN does not compare true with ANY value (even another NAN). Any EQU, GEQ, GRT, LEQ, or LES comparison with at least one NAN input is always false, and any NEQ input with at least one NAN input is always true. Now offers standardized results when using NAN in comparisons.

This implementation affects these instructions: CMP, EQU, GEQ, GRT, LEQ, LES, NEQ.

ControlLogix 5580 Example	ControlLogix 5570 Example
All compares with NAN will be false except for NEQ. 	NAN values compare as equals and their signs are taken into account. 

Mitigation

Revise any logic that relies on the old, non-standard result from an NAN comparison. Also, it is now easier to test for a NAN result. This value is the only value that provides a true result for a 'NEQ TagA TagA' comparison.

Operand Changes

This section describes the changes to operands from the ControlLogix 5570 controller to the ControlLogix 5580 controller.

IMPORTANT Manually determine the impact to your application and correct accordingly.

Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	Yes
Function Blocks (FBD)	Yes
Sequential Function Chart (SFC)	Yes(1)

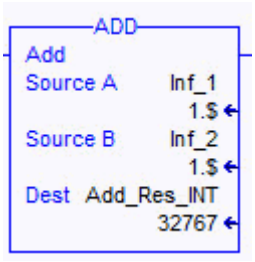
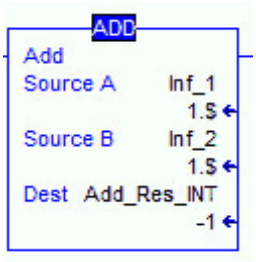
(1) Only affects the embedded Structured Text.

Converting +/- Infinity

Converting +/-Infinity to an integer results in MAX signed integer value with MS flags set based on the value. For 32-bit integer machines, this means 2147483647 for +Inf and -2147483648 for -Inf. Overflow (V) is always set.

ControlLogix 5580 controllers now offer more standardized results when writing/propagating +/- infinity values. MAX/MIN values are less common than 0 or -1 meaning there is less conflict with common program results.

This implementation affects all instructions that store floating point values into integer locations. Applicable to all languages.

ControlLogix 5580 Example	ControlLogix 5570 Example
Writing infinity to an integer is the MAX signed value that is allowed.	Writing +infinity to an integer is -1 value whereas -infinity is stored as 0 in an integer.
	

Mitigation

N/A

Copy/File Instructions

This section describes the changes to copy/file instructions that have been implemented for the ControlLogix 5580 controller in comparison to the ControlLogix 5570 controller.

Topic	Page
COP and CPS into structures	58
JSR and RET parameters passing into structures	59
JSR passing Atomic Data type into an Array or Structure	60
Instructions that operate on arrays	62

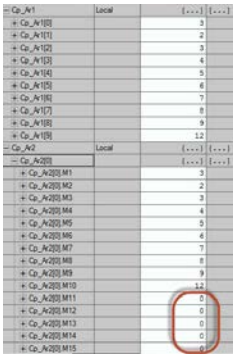
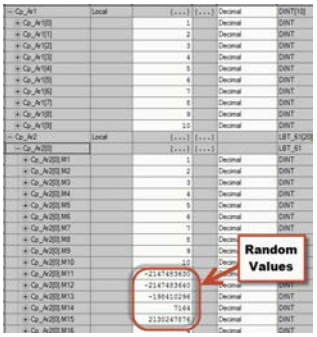
Language	Affected
Ladder Logic (RLL)	yes
Structured Text (ST)	yes
Function Blocks (FBD)	yes
Sequential Function Chart (SFC)	yes(1)

(1) Only affects embedded Structured Text.

IMPORTANT Manually determine the impact to your application and correct accordingly.

COP and CPS into structures

Copying a 10-element array into a 100-element array now moves 10 elements (limited by the source). As always, copying a 100-element array into a 10-element array only moves the first 10 elements of the source (limited by the destination).

ControlLogix 5580 Example	ControlLogix 5570 Example
	

Mitigation

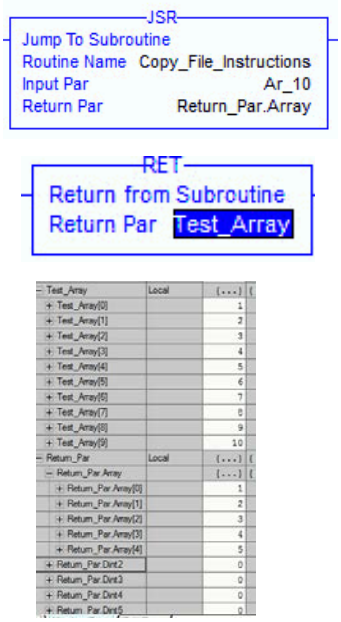
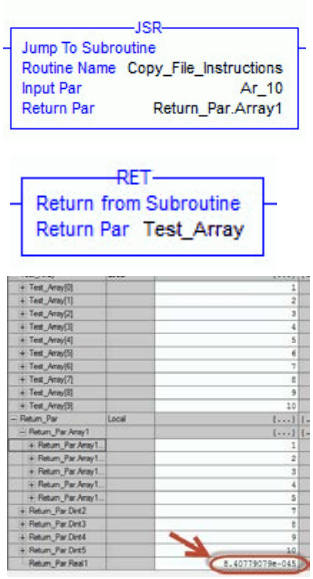
N/A

Language	Affected
Ladder Logic (RLL)	yes
Structured Text (ST)	yes
Function Blocks (FBD)	yes
Sequential Function Chart (SFC)	yes(1)

(1) Only affects embedded Structured Text.

JSR and RET parameters passing into structures

Parameters that pass from JSR (into subroutine) and RET (back to JSR) only use the size of the smaller structure (either source or destination) for the copy. Copies that are made into smaller destinations no longer overrun target arrays or structures.

ControlLogix 5580 Example	ControlLogix 5570 Example
JSR Return Par = Return_Par_Array[5] RET Return Par = Test_Array[10]	JSR Return Par = Return_Par_Array[5] RET Return Par = Test_Array[10]
	

Mitigation

N/A

Language	Affected
Ladder Logic (RLL)	yes
Structured Text (ST)	yes
Function Blocks (FBD)	yes
Sequential Function Chart (SFC)	yes(1)

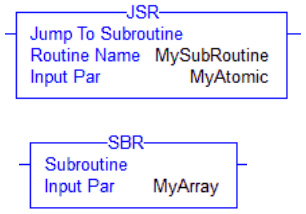
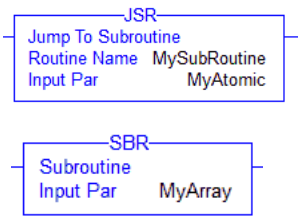
(1) Only affects embedded Structured Text.

JSR passing Atomic Data type into an Array or Structure

With the ControlLogix 5570 controller, if a JSR passed an atomic data element as an input to a subroutine, and that subroutine stores it in an array or structure, then only parts of the target array were populated.

With the ControlLogix 5580 controller, 4 bytes are always copied regardless of the atomic data type. The exception is if the destination is less than 4 bytes. Then the entire destination is copied over.

This implementation affects the JSR and SBR instructions.

ControlLogix 5580 Example	ControlLogix 5570 Example
 4 bytes are always copied unless the destination structure is smaller than 4 bytes. MyAtomic (SINT) = -1 MyArray Before the copy MyArray[0] = 100 MyArray[1] = 100 MyArray[2] = 100 MyArray[3] = 100 MyArray[4] = 100 MyArray[5] = 100 MyArray[6] = 100 If MyArray = SINT structure After the copy MyArray[0] = -1 MyArray[1] = 100 MyArray[2] = 100 MyArray[3] = 100 MyArray[4] = 100 MyArray[5] = 100 MyArray[6] = 100	 Only the first number of the array is stored. • if the destination array is bool array, bool_array[0] is updated, this is only 1 bit • if the destination array is sint array, sint_array[0] is updated, this is 1 byte • if the destination array is int array, int_array[0] is updated, this is 2 byte • if the destination array is dint array, dint_array[0] is updated, this is 4 byte • if the destination array is real array, real_array[0] is updated, this is 4 byte MyAtomic (SINT) = -1 MyArray Before the copy MyArray[0] = 100 MyArray[1] = 100 MyArray[2] = 100 MyArray[3] = 100 MyArray[4] = 100 MyArray[5] = 100 MyArray[6] = 100 If MyArray = SINT structure After the copy MyArray[0] = -1 MyArray[1] = 100 MyArray[2] = 100 MyArray[3] = 100 MyArray[4] = 100 MyArray[5] = 100 MyArray[6] = 100

ControlLogix 5580 Example (Continued)	ControlLogix 5570 Example (Continued)
If MyAtomic (DINT) = -1 If MyArray = SINT structure After the copy MyArray[0] = -1 MyArray[1] = -1 MyArray[2] = -1 MyArray[3] = -1 MyArray[4] = 100 MyArray[5] = 100 MyArray[6] = 100 If MyAtomic (DINT) = -1 If MyArray = Bool structure After the copy MyArray[0] = 1 MyArray[1] = 1 MyArray[2] = 1 MyArray[3] = 1 MyArray[4] = 1 MyArray[5] = 1 MyArray[6] = 1 MyArray[7] = 1 MyArray[8] = 1 MyArray[9] = 1 MyArray[10] = 1 MyArray[11] = 1 MyArray[12] = 1 MyArray[13] = 1 …… MyArray[31] = 1	If MyAtomic (DINT) = -1 If MyArray = SINT structure After the copy MyArray[0] = -1 MyArray[1] = 100 MyArray[2] = 100 MyArray[3] = 100 MyArray[4] = 100 MyArray[5] = 100 MyArray[6] = 100 If MyAtomic (DINT) = -1 If MyArray = Bool structure After the copy MyArray[0] = 1 MyArray[1] = 0 MyArray[2] = 0 MyArray[3] = 0 MyArray[4] = 0 MyArray[5] = 0 MyArray[6] = 0 MyArray[7] = 0 MyArray[8] = 0 MyArray[9] = 0 MyArray[10] = 0 MyArray[11] = 0 MyArray[12] = 0 MyArray[13] = 0 …… MyArray[31] = 0

Mitigation

N/A

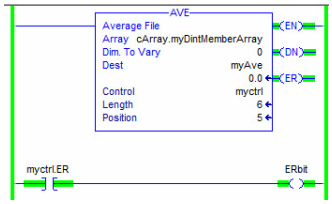
Language	Affected
Ladder Logic (RLL)	Yes
Structured Text (ST)	No
Function Blocks (FBD)	No
Sequential Function Chart (SFC)	No

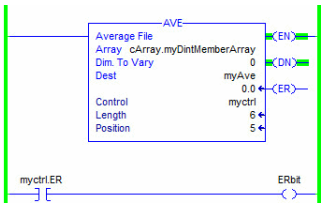
Instructions that operate on arrays

Instruction actions are limited to member array boundaries. If any of these instructions attempt to access past the end of a member array, they set the ER bit and abort the operation.

AVE, BSL, BSR, DDT, FBC, FFL, FFU, LFL, LFU, SQL, SRT, and STD now respect boundaries when reading.

ControlLogix 5580 Example	ControlLogix 5570 Example
These instructions are now limited to member array boundaries.	In previous controllers, these instructions could overwrite member boundaries if the array was within a UDT.





Mitigation

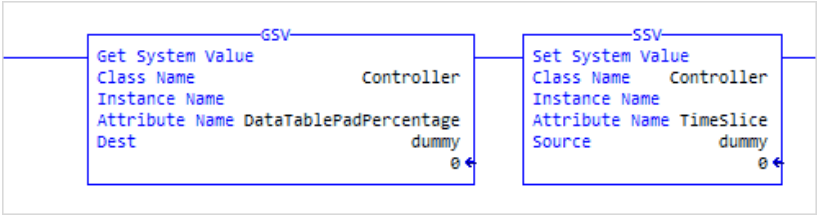
N/A

GSV/SSV Instructions

GSV and SSV instructions that access unused attributes in ControlLogix 5580 controller projects display this verification warning.

Warning: Rung <n>, GSV, Operand 2: Attribute is not used for this controller type. Instruction has no effect.

Figure 11 - GSV/SSV of Controller Attributes



The warning occurs for the following controller attributes:

- DataTablePadPercentage. (GSV only)
- TimeSlice (GSV/SSV)
- ShareUnusedTimeSlice (GSV / SSV)

Diagnostics and Status Indicators

There are several ways that you can diagnose and troubleshoot the ControlLogix® 5580 Controllers.

Controller Status Display and Indicators

The ControlLogix 5580 controllers have a 4-character display, four status indicators, and two EtherNet/IP indicators.

4-Character Display

The ControlLogix 5580 controller 4-character display shows the same messages as the ControlLogix 5570 controllers, along with these updates.

Message on 4-character Display	ControlLogix 5580 behavior
Link Down	Message appears when an EtherNet/IP port does not have a connection. Message scrolls continuously during operation.
Link Disabled	Message appears when you have disabled the EtherNet/IP port. Message scrolls continuously during operation.
DHCP- XX:XX:XX:XX:XX:XX	Message appears when the controller is set for DHCP, but not configured on a network. The message shows the MAC address of the controller. Message scrolls continuously during operation if no IP address is set.
Ethernet Port Rate/Duplex State	The current port rate and duplex state when the port has a connection (for example, 1Gb/FULL). Message scrolls continuously during operation. If not connected directly to another 1 Gb device, then the message shows 100/FULL.
IP Address	The IP address of the controller. Appears on powerup, then scrolls continuously during operation. If the IP address is not yet set, then the MAC address appears.
Duplicate IP - XX:XX:XX:XX:XX:XX	Message appears when the controller detects a device with the same IP Address on the network. The message shows the MAC address of the device with the duplicate IP Address. Message scrolls continuously during operation.
Backup Energy HW Failure - Save Project	A failure with the embedded storage module has occurred, and the controller is incapable of saving of the program in the event of a powerdown. If you see this message, then save your program to SD card before removing power, and then replace the module.
Backup Energy Low - Save Project	The embedded storage module does not have sufficient energy to enable the controller to save the program in the event of a powerdown. If you see this message, then save your program to SD card before removing power, and then replace the module.

Status Indicators

The Run, Force, SD, and OK status indicators function the same as the ControlLogix 5570 controllers.

EtherNet/IP Indicators

The EtherNet/IP indicators show the state of the EtherNet/IP port and communications activity.

Indicator	State	Description
NET	Off	The controller is not configured, or does not have an IP address.
	Flashing green	The controller has an IP address, but no active connections are established.
	Steady green	The controller has an IP address and at least one established active connection.
	Steady red	Duplicate IP Address or invalid configuration.
LINK	Off	No activity. One of these conditions exists: • No link exists on the port. – Verify that the RJ45 cables are properly seated in the adapter and connected devices. • The port is administratively disabled.
	Flashing green	Activity exists on the port.

Controller Web Pages

The controller provides diagnostic web pages that track controller performance, network performance, and backplane performance.

To access the diagnostic web pages, follow these steps.

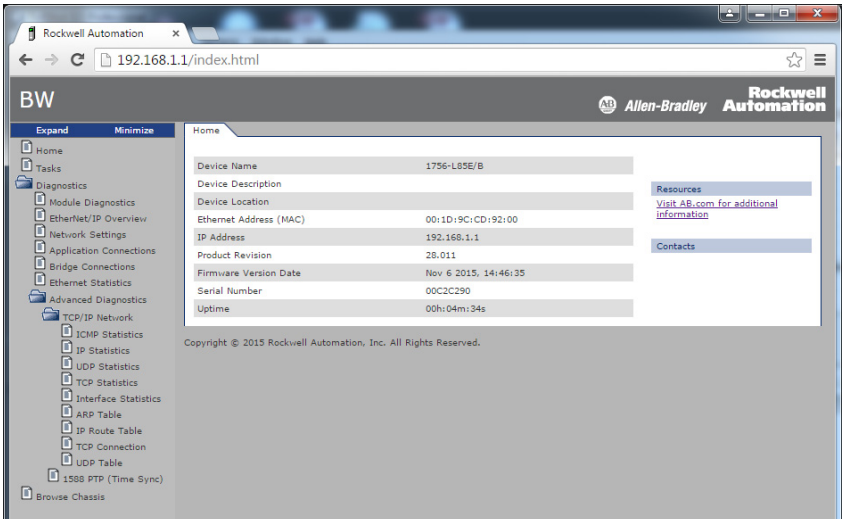
1. Open your web browser.
2. In the Address field, type the IP address of the controller and press Enter.

To access the diagnostic web pages, open the Diagnostics folder in the left-most navigation bar, and click the link for each diagnostic web page you need to monitor.

- The Diagnostics webpages provide communications and messaging data for the controller.
- The Advanced diagnostics webpages provide data about the TCP/IP Network and Precision Time Protocol.

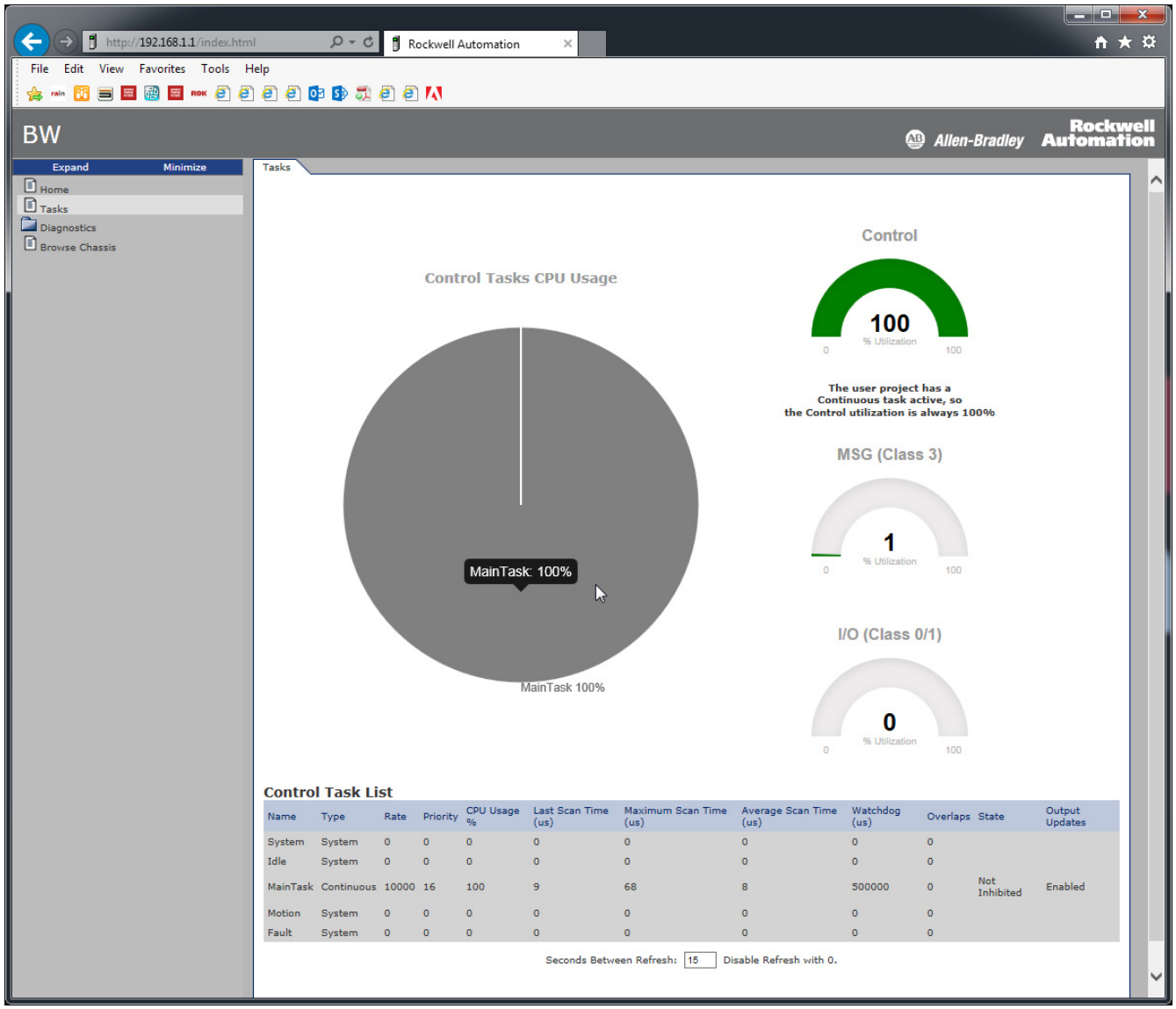
Also see:

- Tasks Webpage on page 65
- Browse Chassis Webpage on page 66



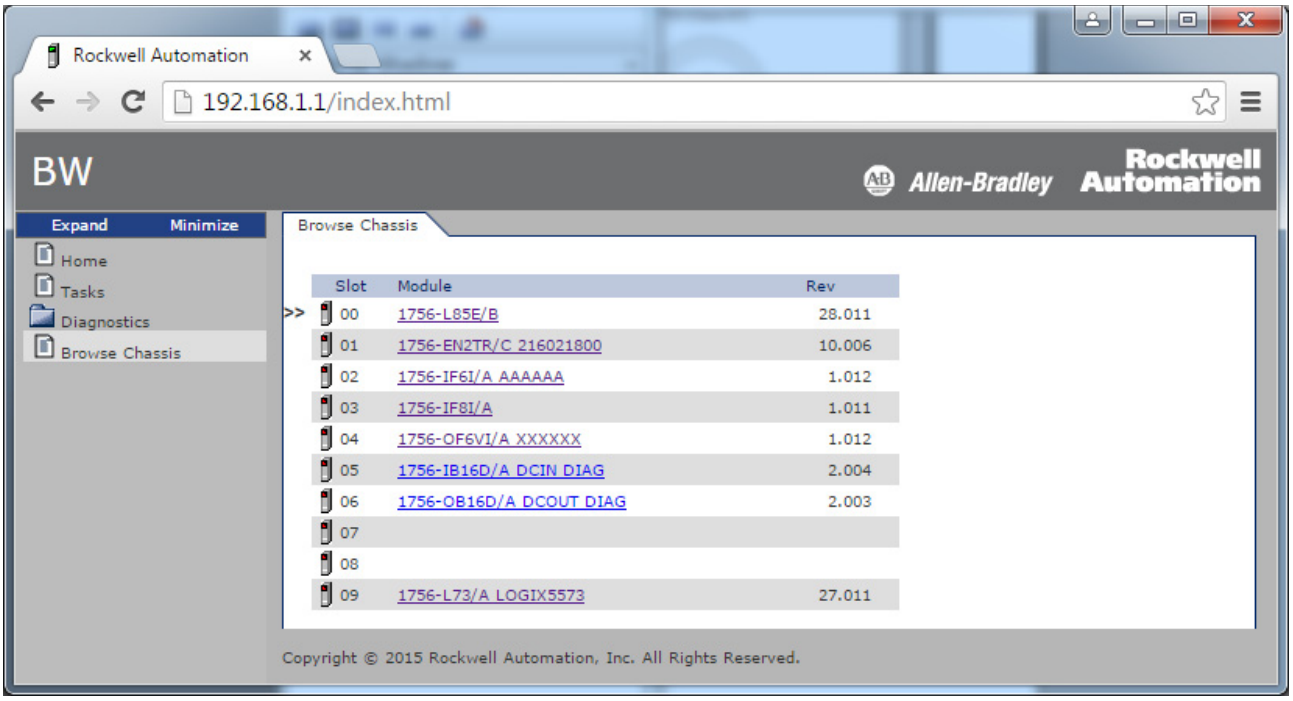
Tasks Webpage

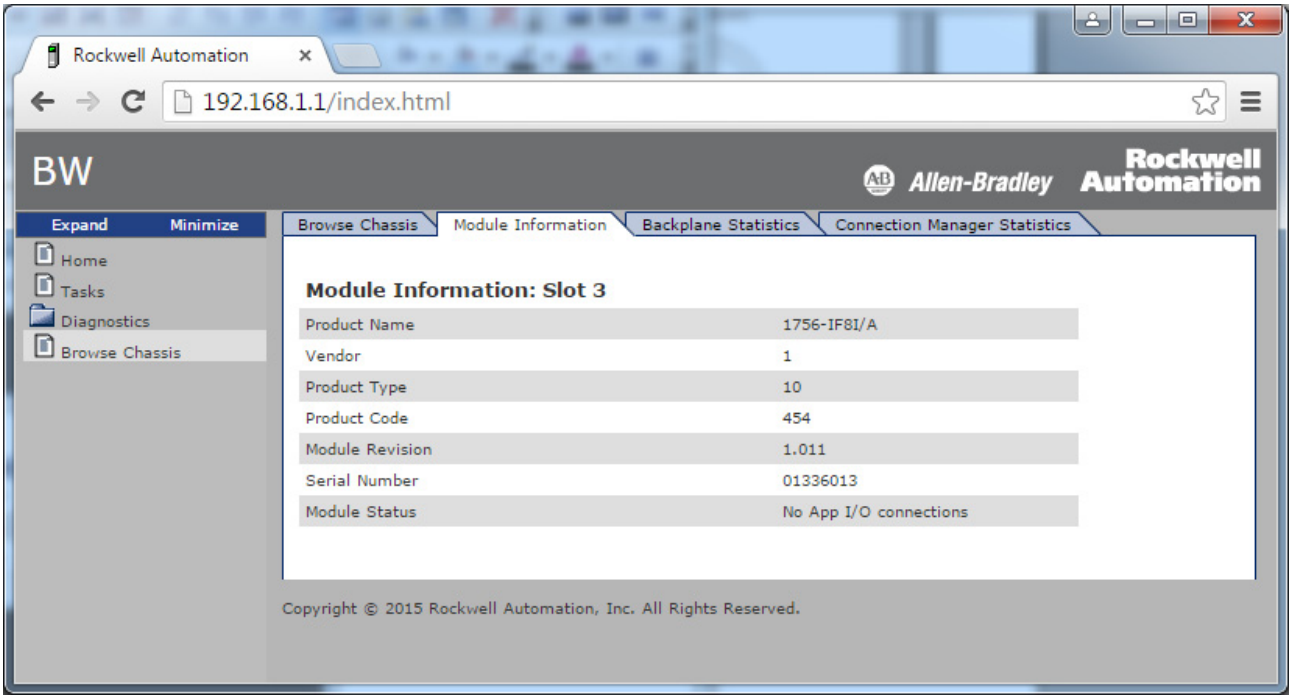
On the Tasks webpage, the pie chart shows the percentage of the control core's CPU consumed by the tasks that are on that core. The gauges show the CPU utilization of the control and communications cores. The table shows the tasks that are running on the Control core (all system tasks are summarized as one task).



Browse Chassis Webpage

Browse Chassis lets you view module information, backplane statistics, and connection statistics for modules in the local chassis.





Configuration Examples

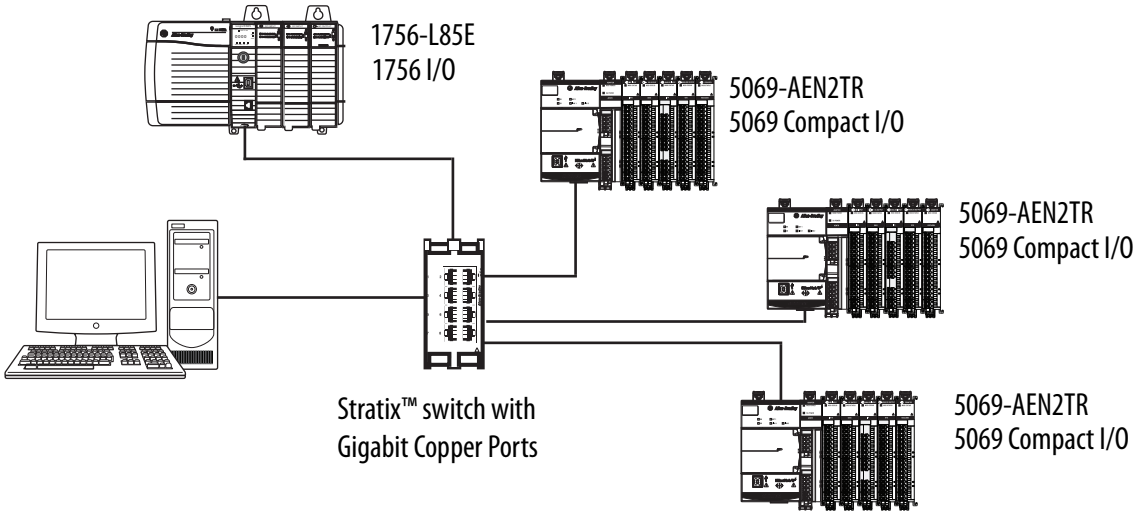
This section describes some of the many system configuration options that are available with ControlLogix® controllers.

The ControlLogix 5580 controller functions in the same applications as the ControlLogix 5570 controller:

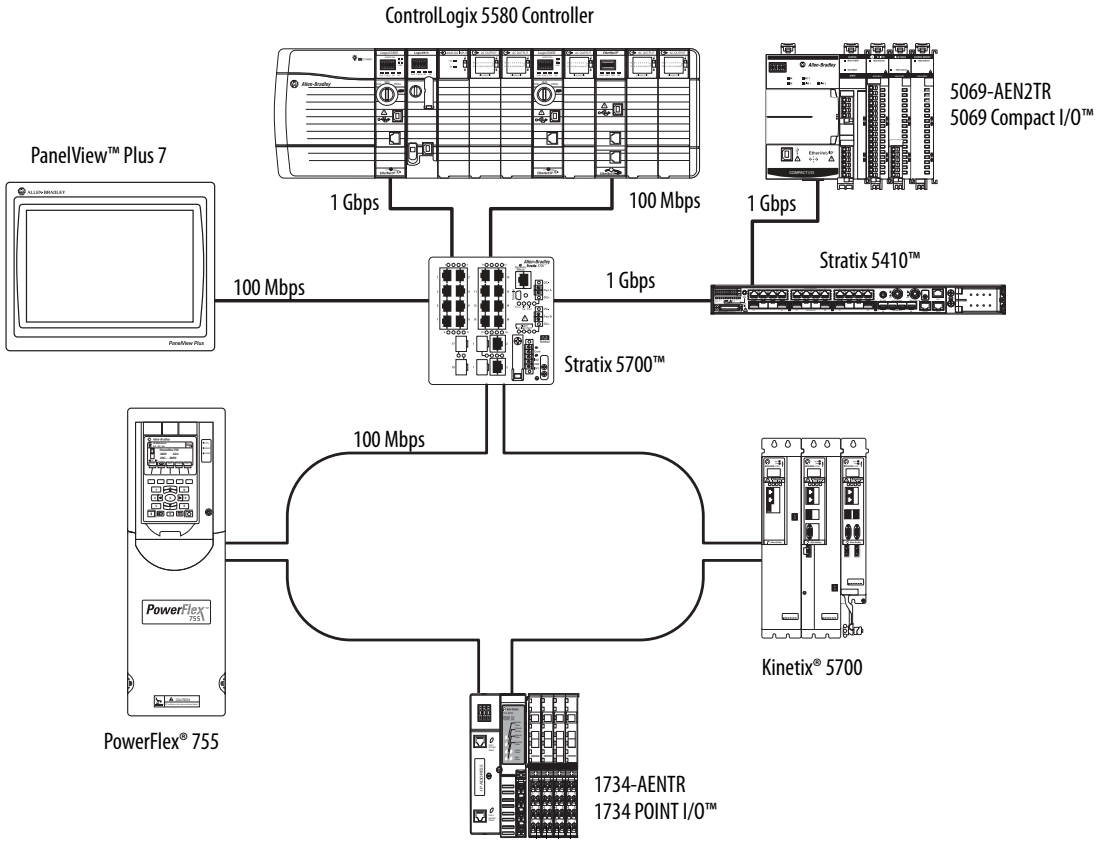
- Standalone controller and 1756 ControlLogix I/O in the same chassis
- Multiple controllers in one chassis. See Multiple Controllers in One Chassis on page 68.
- Multiple devices that are connected via multiple networks
- Device level Ring Topologies

With the available Ethernet port, the ControlLogix 5580 is capable of Gigabit Ethernet when either connected directly to 5069 Compact I/O™, or connected to 5069 Compact I/O through a Gigabit-capable Ethernet switch.

Gigabit Ethernet



Multiple Controllers in One Chassis



Symbols

Numerics

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

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