FlexLogix Controller Revision 11

Cat. No. 1794-L33, 1794-L34, and 1794-L34/B

These release notes should be used with major revision 11, minor revision 26 of the FlexLogix Controller firmware. Use this firmware with:

Update this:	To this revision or later:
RSLinx™ software	2.31
RSLogix 5000™ software	11.11
RSNetWorx™ for ControlNet software	3.23
RSNetWorx for DeviceNet software	3.21

What Is In These Release Notes

These release notes provide the following information:

Publication 1794-RN001T-EN-P - April 2004

Before You Update Your System

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

If:	Then:
Your controller is connected to a DH-485 network.	Disconnect it from the DH-485 network *before* you update the firmware of the controller. If you update the firmware of a controller while it is connected to a DH-485 network, communication on the network may stop.
Your controller is close to its limits of memory.	This revision *may* require more memory than previous revisions. Before you upgrade to this revision, do the following: 1. Check the amount of unused memory that you have in the controller. To determine your unused memory, see either of the following documents: • Knowledgebase document 13964. To access Rockwell Automation's Knowledgebase, go to www.ab.com. Select *Support*. • *Logix5000 Controllers Common Procedures*, publication 1756-PM001E or later 2. If your controller is close to its limits of memory, see "Additional Memory Requirements" on page 11 to determine how much additional memory you require. To upgrade to this revision, you may have to add an expansion memory card to the controller or use a larger memory card.

Enhancements

This revision of FlexLogix controllers contains the following new features:

Enhancement:	Description:
EtherNet/IP Support	The controllers now support for EtherNet/IP™ connectivity using the 1788-ENBT EtherNet/IP communication daughtercard.
Non-Volatile Memory Available	The 1794-L34/B now supports non-volatile memory. Previously this feature was only available with the 1794-L33. This gives FlexLogix the ability to restore the controller's last saved project without a battery. Series B hardware is required for the 1794-L34/B to support Non-Violatile Memory.
FLEX I/O High Speed Counter Support	FLEX I/O very high speed counter (1794-VHSC) is supported on the Local DIN rail.
New Software Support for FLEX I/O Modules	Specific software support has been added to support the 1794-IB32 and OB32 Flex I/O modules.

<table>
<tr><th>Enhancement:</th><th colspan="2">Description:</th></tr>
<tr><td>Sequential Function Chart Programming Language</td><td colspan="2">A sequential function chart (SFC) is similar to a flowchart of your process. It defines the steps or states through which your system progresses. Use the SFC to:
organize the functional specification for your system
program and control your system as a series of steps and transitions
A sequential function chart can contain these elements:
steps
transitions
actions
stops
text boxes</td></tr>
<tr><td rowspan="4">New Instructions For Use with a Sequential Function Chart (SFC)</td><td>This instruction:</td><td>Lets you:</td></tr>
<tr><td>EOT</td><td>Set the state of a transition in an SFC to true or false</td></tr>
<tr><td>SFP</td><td>Pause an executing SFC</td></tr>
<tr><td>SFR</td><td>Reset the execution of an SFC to a different step or stop</td></tr>
<tr><td>Structured Text Programming Language</td><td colspan="2">Structured text is a textual programming language that uses statements to define what to execute. Structured text can contain these components:
assignments
expressions
instructions
constructs
comments
You can either program structured text as a routine or embed the structured text within a sequential function chart</td></tr>
<tr><td>Online Editing of Function Block Routines</td><td colspan="2">This revision lets you edit function block routines (diagrams) while online with the controller.
Online edits include changes to logic, sheet names, pin visibility, block locations, etc.
You edit a function block routine the way you edit a ladder routine: start a pending edit, accept the edit, test the edit, and finally assemble the edit.</td></tr>
</table>

Changes

This revision of FlexLogix controllers contains the following changes:

<table>
<tr><th>Change:</th><th colspan="3">Description:</th></tr>
<tr><td>SIZE Instruction Lets You Specify an Array Tag</td><td colspan="3">The source for a SIZE instruction can now be an array tag. You no longer have to specify the first element in the array.</td></tr>
<tr><td>PLC5 Typed Read Message Errors If Destination Is Too Small</td><td colspan="3">In a Message (MSG) instruction that is configured for PLC5 Typed Read, the instruction no longer executes if the Destination is too small for the Source data. If this occurs, the instruction sets the ER bit.

If a MSG instruction is configured for PLC5 Typed Read and the data type of the Source does not match the data type of the Destination, the instruction converts the Source to the data type of the Destination. For example, if the data type of the Source is INTs and the data type of the Destination is DINTs, the instruction converts the INTs to DINTs. In this example, the Destination requires one DINT element for each INT of the Source data.

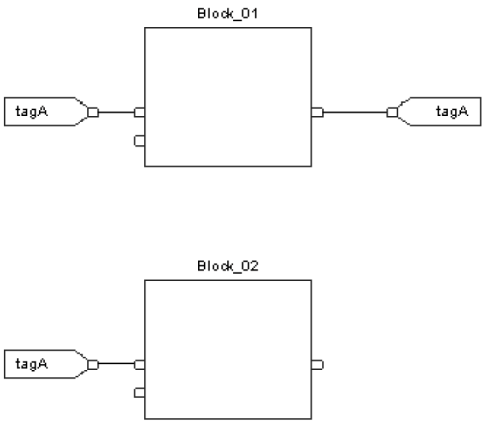
In previous revisions, if a data conversion occurred but the Destination was too small, data beyond the Destination was overwritten. This may have caused the controller to fail during a download or online edit operation.</td></tr>
<tr><td>REAL Data Type Shows an Extra Digit of Precision</td><td colspan="3">The REAL data type now shows a 32-bit (4-byte) IEEE floating-point value with the following range:
• -3.40282347E³⁸ to -1.17549435E⁻³⁸ (negative values)
• 0
• 1.17549435E⁻³⁸ to 3.40282347E³⁸ (positive values)
The REAL data type also stores ±infinity, ±NAN, and -IND, but the software display differs based on the display format.</td></tr>
<tr><td></td><td>Display Format:</td><td>Equivalent:</td><td>Software Display:</td></tr>
<tr><td></td><td>Real</td><td>+infinite
- infinite
+NAN
-NAN
-indefinite</td><td>1.$
-1.$
1.#QNAN
-1.#QNAN
-1.#IND</td></tr>
<tr><td></td><td>Exponential</td><td>+infinite
- infinite
+NAN
-NAN
-indefinite</td><td>1.#INF000e+000
-1.#INF000e+000
1.#QNAN00e+000
-1.#QNAN00e+000
-1.#IND0000e+000</td></tr>
<tr><td></td><td colspan="3">The software also stores and displays the IEEE subnormal range:
• -1.17549421E⁻³⁸ to -1.40129846E⁻⁴⁵ (negative values)
• 1.40129846E⁻⁴⁵ to 1.17549421E⁻³⁸ (positive values)</td></tr>
</table>

Change:	Description:
PIDE_AUTOTUNE Structure Contains New Status Bits	When you use the PIDE Auto Tune feature, it is possible to set up a tuning environment in which the auto tune procedure successfully completes but the results are unusable. To provide an indication that this occurred, the PIDE_AUTOTUNE structure includes new members. You still have the option of accepting the auto tune values.

To see if:	Examine this member of the PIDE_AUTOTUNE structure:	Explanation:
Observed PV change was too small	PVChangeTooSmall	The PV change seen as a result of the CV step change was very small. • Filter your PV to eliminate excessive noise, which could have caused the autotuner to mistake a noise spike for an actual PV response. • Make sure that the PIDE instruction is executing at an appropriate rate for your process. For example, if your process is a slow temperature loop, run your PIDE instruction in a slow (0.5 sec to 2 sec) periodic task. An execution rate that is too fast can cause the autotuner to mistake a noise spike right after the autotuner starts for an actual PV response.
Step size is too small	StepSizeTooSmall	The CV step size that you configured for the autotuner was very small. You might get better results if you autotune the loop again using a larger step size.
Process gain is too large	GainTooLarge	The autotuner identified your process as having a very large process gain. In other words, a small step change in CV output caused a very large change in PV. Make sure that your control actuator is properly sized for this application.
Process gain is too small	GainTooSmall	The autotuner identified your process as having a very small process gain. In other words, a step change in CV output caused only a very small change in PV. To get better results: • Filter your PV to eliminate excessive noise, which could have caused the autotuner to mistake a noise spike for an actual PV response. • Make sure that the PIDE instruction is executing at an appropriate rate for your process. For example, if your process is a slow temperature loop, run your PIDE instruction in a slow (0.5 sec to 2 sec) periodic task. An execution rate that is too fast can cause the autotuner to mistake a noise spike right after the autotuner starts for an actual PV response. • Make sure that your control actuator is properly sized for this application.
Dead time is	LongDeadTime	The autotuner identified your process as having a long deadtime. In other words, it

You can also examine the bits of the AtuneStatus member for the same information:

For this member:	Examine this bit of the AtuneStatus member:
PVChangeTooSmall	27
StepSizeTooSmall	28
GainTooLarge	29
GainTooSmall	30
LongDeadTime	31

Change:	Description:
Use the Same Tag in Multiple IREFs and OREFs	You can use the same tag in multiple IREFs and an OREF in the same routine. Because the values of tags in IREFs are latched every scan through the routine, all IREFs will use the same value, even if an OREF obtains a different tag value during execution of the routine. In this example, if tagA has a value of 25.4 when the routine starts executing this scan, and Block_01 changes the value of tagA to 50.9, the second IREF wired into Block_02 will still use a value of 25.4 when Block_02 executes this scan. The new tagA value of 50.9 will not be used by any IREFs in this routine until the start of the next scan. 

Corrected Anomalies

This revision of FlexLogix controllers corrects the following anomalies:

Anomaly:	Description:
Rack Optimized Input May Be Momentarily Invalid in a High Priority Task or Trend	Previously, the controller may have momentarily referenced invalid Rack Optimized input data for I/O modules on the local or local2 rails under the following conditions: • The controller referenced data from at least two, adjacent, local input modules (including combination modules) that were mapped as Rack Optimized. • The module which has an input module to the left of it may exhibit the anomaly. In other words, an input module in slot 0 did not exhibit the anomaly. • A higher priority task than the I/O Update Task (priority 7) referenced the data. This included user tasks with priority of 1-6 and any trends; trends have a priority higher than 1. **IMPORTANT**: Instructions within a periodic task with priority of 7-15 (default periodic task priority is 10) or the continuous task did not exhibit this anomaly. For example, a controller referenced data from input modules in Slot 0 and Slot 1. Both modules were Rack Optimized. A trend on inputs from Slot 1 may have exhibited the anomaly. A task with a priority of 1 may have exhibited the anomaly with inputs from Slot 1. A task with a priority of 10 did not exhibit the anomaly.

Anomaly:	**Description:**
Problems on Power-Up or Power Cycling When a 1794-VHSC Exists on the Local DIN Rail	When using a 1794-VHSC on the local or extended-local rails, the FlexLogix controller experienced the following anomalies after power-up or when power was cycled: • The controller may have lost its current Date and Time. • The controller may have had difficulties establishing connections to the 1794-VHSC or other I/O modules, including RSLogix 5000 reporting a "module in use" error. The support of the 1794-VHSC on the local or extended-local rails was added in v11, so this anomaly only occurs with firmware v11 revisions up to and including 11.24. There is no workaround for the anomaly. You must flash upgrade the controller to firmware revision 11.25.
Product Service Advisory—Power Disruptions Cleared Memory	**IMPORTANT**: This revision corrects the following anomaly only if your controller is currently at 11.x firmware. If power to the controller turned on and then turned off again in less than a second, the controller might have cleared the project from its memory. • If the controller did not have enough time to complete a critical portion of the power-up sequence (less then 1 second), the controller typically cleared its memory. • This might have occurred during brownouts or other situations were power to the controller fluctuated for a short duration.
Online Edit of Tags Might Have Caused Communication Failure	If you deleted an unused tag while online, you might have lost communication with the controller. RSLinx showed a Red X over the controller and you were unable to communicate with the controller through either the serial port or another communication module. The communication failure could have occurred immediately after you deleted the tag or later on in the execution of the project. A power cycle would temporarily clear the problem.
Size of the ASCII Buffer *No Longer* Limited to 255 Characters	You can set the size of the ASCII buffer of the serial port to any number of characters up to 65,536 characters. In previous revisions, a setting larger than 255 characters caused ABL instructions to miss the termination character and set status bits to erroneous values.
Failure to Write to Tags Via OPC/DDE	In the R11 firmware revisions prior to this revision, you could not write to a tag that was an alias for the tag of an I/O module. Neither tag would accept the write but the controller would not report a failure. For example, the failure to write occurred when another software application attempted to write to an alias tag via OPC/DDE communications.

<table>
<tr><th>Anomaly:</th><th>Description:</th></tr>
<tr><td>Load from Nonvolatile Memory Produced Faults</td><td>If a project automatically loaded from the nonvolatile memory of a controller, a fault might have occured.

<table><tr><th>If the project:</th><th>Then:</th></tr><tr><td>contained motion axes</td><td>A fault was more likely to occur. The following faults might have occurred:
non-recoverable fault (solid red OK LED). This caused the controller to clear the project from its memory.
motion group fault. The controller failed to become the CST master. This caused the motion group to fault because there was no CST master in the chassis.</td></tr><tr><td>did not contain motion axes</td><td>A fault was still possible, though less likely. The following fault might have occurred:
non-recoverable fault (solid red OK LED). This caused the controller to clear the project from its memory.</td></tr></table>
A project automatically loads from nonvolatile memory only if you configure it to do so. You can configure a project to automatically load under one of the following circumstances:
during power-up
when the memory of the controller is empty</td></tr>
<tr><td>Deleting a Tag Online Caused Slow Communications or Controller Failure</td><td>If you deleted a tag while online with the controller either of the following might have occurred:
communications would slow down
the controller would fail (solid red OK LED)</td></tr>
<tr><td>Controller Occasionally Failed a Parity Check</td><td>This revision lets the controller recover from some parity errors without user intervention.</td></tr>
<tr><td>Automatic Reset of an SFC Produced Erroneous Instruction Execution</td><td>If you chose the Automatic Reset option for your SFCs, some instructions would execute incorrectly when executed directly or indirectly by an SFC:
JSR/RET instruction pair produced a major fault.
FFL, FFU, LFL, LFU instructions caused the controller to fail (solid red OK LED).</td></tr>
<tr><td>SQO Instruction Failed to Execute a Prescan</td><td>If you chose the Restart at most recently executed step option for your SFCs, an SQO instruction would not execute a prescan when executed directly or indirectly by an SFC.</td></tr>
<tr><td>BTD Instruction Caused Controller Failure</td><td>If an SFC directly or indirectly executed a BTD instruction and the Length was greater than 31, the controller would fail (solid red OK LED).</td></tr>
<tr><td>SFC Alarming Failed to Stay Enabled or Disabled</td><td>In a step of an SFC, the AlarmEnable setting might not stay at the state you set it if you change it while online. For example, if you checked the AlarmEnable check box while online, it might revert to the cleared state later in the execution of your project.</td></tr>
<tr><td>SCRV Instruction Caused Controller Failure</td><td>Under certain combinations of input parameters, an S-Curve (SCRV) instruction might have divided a value by zero. This would have caused the controller to fail (solid red OK LED).</td></tr>
</table>

Restrictions

This revision of FlexLogix controllers has the following restrictions:

<table>
<tr><th>Restriction:</th><th>Description:</th></tr>
<tr><td>LDL2 Instruction Produces Inaccurate Coefficients or Controller Failure</td><td>A Second-Order Lead Lag (LDL2) instruction may produce the following:
inaccurate internal coefficients
controller failure (solid red OK LED)
This may occur under the following combination of circumstances:
You initially set the following input parameters = 0:
WLead
WLag
ZetaLag
While the controller is in run mode, you change any of the following parameters:
WLead
WLag
ZetaLead
ZetaLag
Order
Instead of setting the input parameters = 0, set the input parameters as follows:<table><tr><th>If:</th><th>Then set the input parameters as follows:</th></tr><tr><td>Order = 1</td><td>WLead = 0.0000001/DeltaTime

WLead = 0.0000001/DeltaTime

ZetaLag = 0.05</td></tr><tr><td>Order = 2</td><td>WLead = 0.00001/DeltaTime

WLead = 0.00001/DeltaTime

ZetaLag = 0.05</td></tr></table></td></tr>
<tr><td>Project May Fail to Download</td><td>If you update the controller from firmware revision 10.x to this revision, the project may fail to download. This occurs if the project contains more than 250 connections:
Firmware revisions 10.x erroneously let you exceed 250 connections.
This revision requires that the project stay within 250 connections.
If you created more than 250 connections while using firmware revision 10.x, the project will no longer download after you update it to this firmware revision.
If this occurs, reduce the number of connections.</td></tr>
</table>

DH-485 Communications Recommendations

We recommend that you use DH-485 communications as follows:

- If you update the firmware of a controller while it is connected to a DH-485 network, communication on the network may stop. To prevent this, disconnect the controller from the DH-485 network **before** you update the firmware of the controller.
- Place a FlexLogix controller on a DH-485 network only when you need to add the controller to an existing system. For new systems, use a ControlNet network.
- While your system is running, use a DH-485 network to send messages between devices (e.g., controllers, PanelView terminals).
- To use RSLogix 5000 software over a DH-485 network (upload, download, monitor, edit while online), place all controllers in the program mode. Excessive traffic may make it impractical to use RSLogix 5000 software over this network while your system is running.

Additional Memory Requirements

This revision *may* require more memory than previous revisions. To estimate the additional memory that your project *may* require, use the following table:

If you have this firmware revision (add *all* that apply):	**Then add the following memory requirements to your project:**				**Which comes from this type of memory:[1]**	
	Component			**Increase per instance**	**I/O (base)**	**expansion**
10.x or earlier	programs			12 bytes		Yes
	routines			16 bytes		Yes
9.x or earlier	tag that uses the MESSAGE data type			376 bytes		Yes
8.x or 9.x	produced or consumed axis			(-21.6K bytes)	Yes	
	axis that *is not* produced or consumed			(-21.6K bytes)		Yes
8.x or earlier	output cam execution targets			5,404 bytes		Yes
	motion group			32 bytes		Yes
7.x or earlier	project			1050 bytes	Yes	
	tags			0.55 bytes		Yes
	messages that: transfer more than 500 bytes of data *and* target a controller in the same chassis This memory is allocated only when the MSG instruction is enabled. To estimate, count the number of these messages that are enabled and/or cached at one time.			2000 bytes	Yes	
6.x or earlier	base tags			24 bytes		Yes
	alias tags			16 bytes		Yes
	produced and consumed tags	Data type	Bytes per tag			
		DINT	4	12 bytes	Yes	
		REAL	4	12 bytes	Yes	
				3 x bytes per tag	Yes	
				3 x bytes per tag	Yes	
				3 x bytes per tag	Yes	
				3 x bytes per tag	Yes	
6.x	routines			68 bytes		Yes
5.x or earlier	routines			116 bytes		Yes

(1) In the FlexLogix controller, the I/O and expansion memory types are merged into a single memory pool.

IMPORTANT

An internal change on FlexLogix controllers resulted in less available memory with major revision 7 as compared to major revision 6.

- The 1794-L33 controller has 34k bytes less memory available.
- Thee 1794-L34 controller has 96k bytes less memory available.

Subsequent upgrades to new major revisions maintain this internal change.

Connecting Power Supplies

If you use a 1794-PS13 power supply, connect the power supply to the controller **before** applying ac power to the power supply. This is also the recommended installation procedure for any third-party power supply you might use. If you intend to use a 1794-PS1 power supply, you must install a 1 Kohm, 2-watt resistor on the 24V dc side of the power supply.

Rockwell Automation Support

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

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

Installation Assistance

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

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

New Product Satisfaction Return

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

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

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