

# Process Remote I/O (RIO) Communication Interface Module

Catalog Number 1757-ABRIO

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## About This Publication

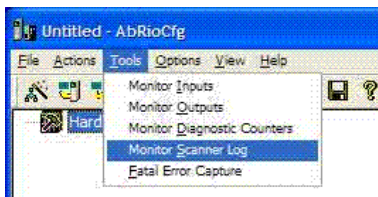
These release notes provide the following information for the 1757-ABRIO module, firmware revision 2.5. Revision 2.5 supports new flash memory now being used in the module. See [Can You Backflash Your Module? on page 2](#), for information about backflashing issues that may arise due to this new flash memory.

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### Can You Backflash Your Module?

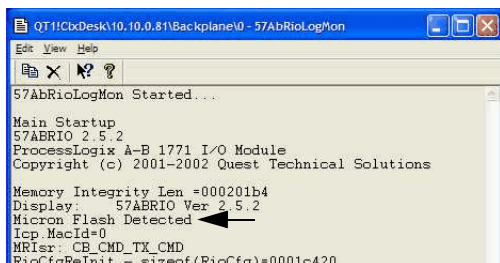
Modules that contain the new memory are not compatible with firmware revisions earlier than 2.5. If you attempt to backflash these modules to an earlier firmware revision, the module will be rendered inoperable and will need to be returned to the factory for repair. To determine if you can backflash a module to a firmware revision earlier than 2.5, please follow these steps.

1. Start AbRioCfg software.



2. From the Tools menu, choose Monitor Scanner Log.
3. Specify the path to the 1757-ABRIO module.

The debug log opens.



- If there is a line that reads 'Intel C3 Flash Detected', you **cannot** backflash the module with firmware revisions earlier than 2.5.
- If there is a line that reads 'Micron Flash Detected', or there is no 'Flash Detected' line, you **can** backflash the module with firmware revisions earlier than 2.5.

## Process Remote I/O (RIO) Communication Interface Module, Firmware Revision 2.4

This section provides the following information for the 1757-ABRIO module, firmware revision 2.4, and AbRioCfg.exe software, version 2.4.

### Corrected Anomaly in Revision 2.4

The 1757-ABRIO module firmware revision 2.4 corrects the anomaly that could cause the error M#8a on rare occasions. This error caused the 1757-ABRIO module to stop scanning the 1771 I/O network.

During the error, outputs would perform as expected when they lose communication. This behavior would be the same as the cable being cut or the 1756 chassis losing power.

This error can be cleared by using the Fatal Error Capture function in the AbRioCfg software or updating the firmware with ControlFLASH software.

### Enhancements in Revision 2.4

The enhancements for the 1757-ABRIO, module firmware revision 2.4, include the following items:

- A profile in the AbRioCfg software, version 2.4, was added.
- The firmware was modified to add support for a GD1 adapter.

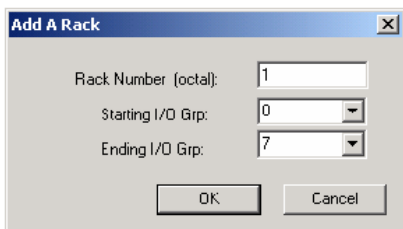
### Control Block Transfer Execution

The 1757-ABRIO module off-loads processing from the control processor by executing block transfers periodically. With the 1203-GD1 remote I/O interface module, it would be useful to be able to control block transfer execution under program control.

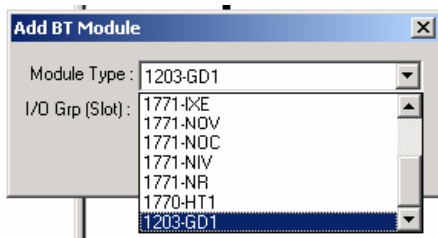
1757-ABRIO module firmware, revision 2.4 or later, with the AbRioCfg program, version 2.4 or later, adds support for the 1203-GD1 remote I/O interface module. These versions let you execute block transfer reads and writes under program control.

### Configure the 1203-GD1 Module in AbRioCfg

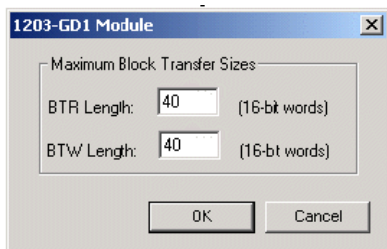
1. Add the rack that the 1203-GD1 module occupies on the remote I/O network.
2. Set the rack size to match the size configured in the 1203-GD1 hardware.



3. Right-click the rack and choose Add Module.
4. From the Module Type pull-down menu, choose 1203-GD1.



5. Set the maximum sizes for the block transfer reads and writes you need to execute.



### *Map the Data*

1. Create a numeric read tag and a numeric write tag.
2. Map the 1203-GD1 module to each tag by dragging it from the I/O tree to the tag.

The integer block transfer data is packed into numeric data. Two 16-bit words of block transfer data are packed into one numeric (REAL) value.

### *For Block Transfer Write Data*

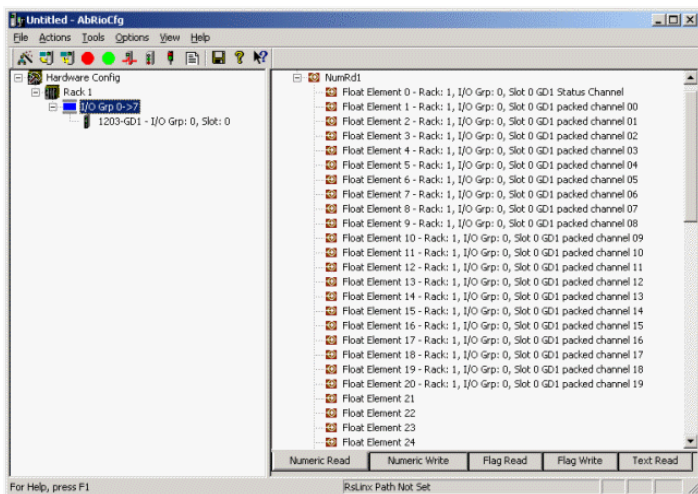
1. Build the block transfer in an INT array in the ControlLogix controller.
2. Copy the data to a REAL array.
3. Use a MSG instruction to send it to a numeric write tag in the 1757-ABRIO module.

### *For Block Transfer Read Data*

1. Read a numeric read tag from the 1757-ABRIO module into a REAL array in the ControlLogix controller.
2. Copy the data into an INT array.

## Numeric Read Tag

The first element (1 REAL or 2 16-bit INTs) in the numeric read tag contains status information for the 1203-GD1 module. The rest consists of block transfer read data.



## Status Information

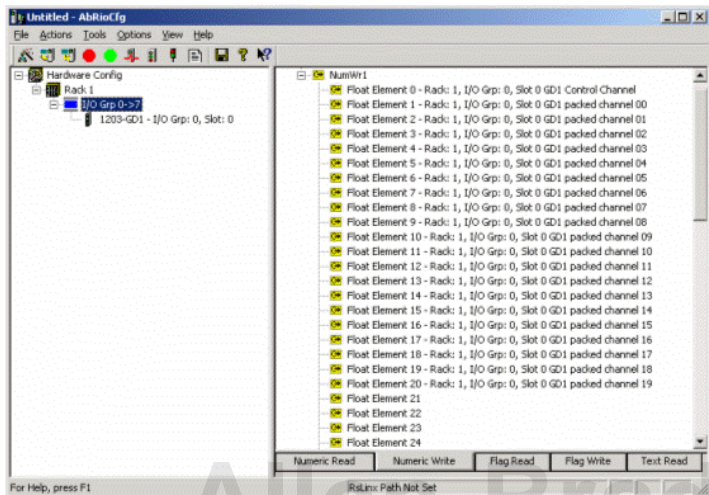
Word	Bits	Description
0	0...7	BTR update counter
	8...11	BTR error code
1	0...7	BTW update counter
	8...11	BTW error code

## Error Codes

Code	Description
0	Success
1	Block transfer ignored by module
2	Protocol error
3	Build BTW failed
4	Length > configured maximum
6	BTR length overrun

### Numeric Write Tag

The first element (1 REAL or 2 16-bit INTs) in the numeric write tag contains control information for the 1203-GD1 module. The rest consists of block transfer write data.



### Control Information

Word	Bits	Description
0	0..6	BTR length
	8	BTR enable toggle
1	0..6	BTW length
	8	BTW enable toggle

The lengths are the block transfer lengths, in 16-bit integers. The toggle bits control execution of the block transfer.

Follow these steps to execute a block-transfer read or write.

1. Read the corresponding block-transfer update counter from word 0 (BTR counter) or word 1 (BTW counter).
2. Set the enable toggle bit to the opposite state of bit 0 of the counter.

For example, if bit 0 of the counter is 0, set the enable toggle to 1. If bit 0 of the counter is 1, set the enable toggle to 0.

When the 1757-ABRIO module sees that the enable toggle is different from bit 0 of the counter, it executes the block transfer on the remote I/O network.



## Executing Block Transfers

The following information discusses how the 1203-GD1 module executes block transfers.

### *Discrete Handshaking*

The 1203-GD1 module uses bits in its discrete-I/O group 0 input data to indicate its readiness to accept block transfers. Your application should check these bits before sending a block transfer request to the module.

- If bit 10 is set, it is ready to accept a block transfer read request.
- If bit 13 is set, it is ready to accept a block transfer write request.
- Bit 8 indicates that the module is ready for block transfer operation.

### *Execution*

Follow these steps to execute a block transfer.

1. Read the discrete data for I/O group 0.
  - If bit 10 is set, the 1203-GD1 module is ready for a block transfer read.
  - If bit 13 is set, the module is ready for a block transfer write.
2. Read the block transfer update counters.

Use a MSG instruction to read the numeric read tag that is mapped to the 1203-GD1 module into a REAL array in the ControlLogix controller.

3. Use a COP (copy) instruction to copy the REAL array to an INT array.
4. Specify the source and destination address to the element level.

The length in the COP instruction is the number of destination elements.

**5.** Build the block transfer in an INT array.

Follow these steps for a block transfer write.

- a. Set the BTW length in bits 0...6 of control word 1.
- b. Place the contents of the block transfer write message in the array immediately after the two control words.
- c. For a block transfer read, set the BTR length in bits 0...6 of control word 0.
- d. Set the BTR length in bits 0...6 of control word 0.

**6.** Toggle the block transfer enable toggle bit.

- For a block transfer read, toggle bit 8 of control word 0.
- For a block transfer write, toggle bit 8 of control word 1.

**7.** Use a COP (copy) instruction to copy the message into a REAL array.

**8.** Specify the source and destination address to the element level.

The length in the COP instruction is the number of destination elements.

**9.** Use a MSG instruction to send the REAL array to the numeric write tag that is mapped to the 1203-GD1 module.

**10.** Check the block transfer status.

**11.** If the block transfer was a block transfer read, follow these steps.

- a. Use a MSG instruction to read the numeric read tag from the 1757-ABRIO module into a REAL array.
- b. Use a COP instruction to transfer the REAL array to an INT array.
- c. Extract the block transfer data.

## Process Remote I/O (RIO) Communication Interface Module, Firmware Revision 2.3, and ABRioCfg Software Updates

This section provides the release notes for firmware 2.3.

- Added the Ignore Under/Over Range option.
- Corrected an anomaly with the 1771-ASC module and earlier revision 1771-ASB modules.
- Added support to read/write raw block-transfer tables.

**TIP**

You do not need to install the updated AbRioCfg software provided to apply the firmware update. However, if you want to use the Ignore Underrange and Overrange Status Bits enhancement as described below, you must install the updates to the AbRioCfg software.

### Corrected Anomaly

Firmware revision 2.3 corrects an anomaly with the 1771-ASC module and earlier revision 1771-ASB modules. In Run mode, discrete inputs that were on would intermittently appear to be off in the 1757-ABRIO data table.

### Enhancements

The enhancements for the 1757-ABRIO module firmware revision 2.3 include the following.

#### Access to Read/Write Raw Block Transfer Tables

- Enables access to block transfers up to 64 words, no scaling or offset, just raw word data.
- Enables the 1757-ABRIO module to support remote I/O devices such as a PanelView display.

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### Ignore Under/Over Range Option

- In earlier revisions, if the underrange or overrange status bits were set, the module would always convert the corresponding data value to a floating point not-a-number (NaN). In the ControlLogix environment, it is sometimes not desirable to process NaN.
- Prevents NAN if under/over Range bits are set.
- The number from the module is passed through (with normal scale and offset).

### Ignore Underrange and Overrange Status Bits

The 1757-ABRIO module, firmware revision 2.3 and later, supports an option to ignore underrange and overrange status bits. If you use this option, your ladder logic application should monitor the underrange and overrange bits returned by the I/O module. This option is global and applies to all the block transfer modules in the configuration. You cannot set it for individual modules.

To ignore underrange and overrange status bits, do the following.

1. In the AbRioCfg software, version 2.3 and later, choose the Options menu and check Ignore Under/Over Range.
2. Save the configuration.
3. Download the configuration to the 1757-ABRIO module.
  - If the option is set and the module performs a block transfer read and an underrange or overrange bit is set for a data value, the module will scale the value and not change the value to NaN.
  - If the option is not set, the module behaves as in previous revisions. If an underrange or overrange bit is set for a data value, the module will convert the scaled value to NaN.

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**IMPORTANT**

You cannot create a configuration with the option set and use it with an earlier version of AbRioCfg software. Version 2.3 and later of AbRioCfg will still read configurations created with earlier versions of AbRioCfg software.

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## Access to Raw Block Transfer Tables

Prior to firmware revision 2.3, the firmware for the 1757-ABRIO module limited mapped data to 32 words of block transfer read and write data. For some modules, access to as many as 64 words of block transfer read and block transfer write data is useful.

With firmware revision 2.3 and later, you can now access up to 64 words in the read/write raw block transfer tables by using MSG instructions. No scaling or offset is needed; use raw word data. This change makes it possible to exchange block transfer read and write data with modules other than I/O modules, such as a PanelView display.

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**IMPORTANT**

You cannot map 64 words of block transfer read/write data tags for cyclic updates.

This option provides a way to access all 64 words of raw block transfer read/write data by using MSG instructions. You should not map data if you're writing it with a MSG instruction. If you do, data would be written to the 1757-ABRIO module from two places—from the mapped data and from the MSG instruction, and the data that the module wrote to the remote I/O network would just be from whoever got in last.

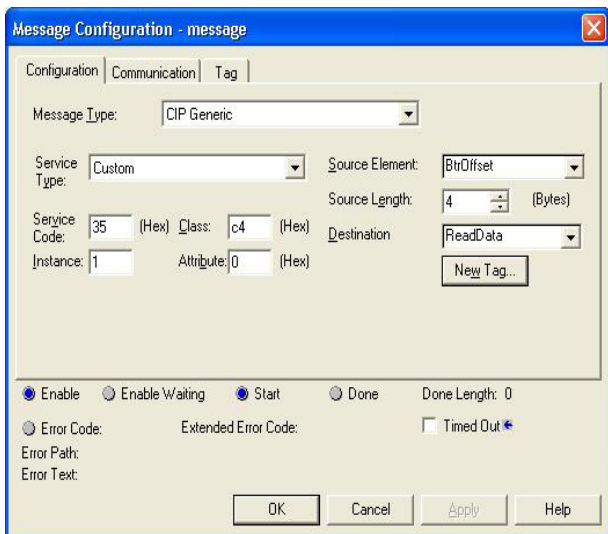
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Using unscheduled messages, you can access the raw block transfer data tables for the generic module to read block transfer read data from the module or to write block transfer write data to the module.

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## Read Block Transfer Read Data

1. In RSLogix 5000 software, create a MSG instruction.



2. For the Message Type, choose CIP Generic.
3. For the Service Type, choose Custom.

Use the following parameters.

MSG Parameter	Block Transfer Read
Service code (hex)	35
Class (hex)	C4
Instance	1
Attribute	N/A

The Source element is a tag of type INT, size 2, which tells the module the location and size of the block transfer read data you want to obtain. The first word of this array is the offset of the data in the block transfer read data table, calculated as follows:

offset =  $1024 * \text{rack} + (\text{I/O group} * 2 + \text{slot}) * 64 + \text{word offset in BTR}$   
 where the rack number is in decimal.

**EXAMPLE**

The offset for the start of the block transfer read data for a module at rack 1, I/O group 7, slot 1 is offset =  $1024 * 1 + (7 * 2 + 1) * 64 = 1984$ .

The second word of the two-word array is the number of words of block transfer data to read. The Source Length should be 4 (bytes). The Destination is an array of INTs where the block transfer read data will be stored.

### *Write Block Transfer Write Data*

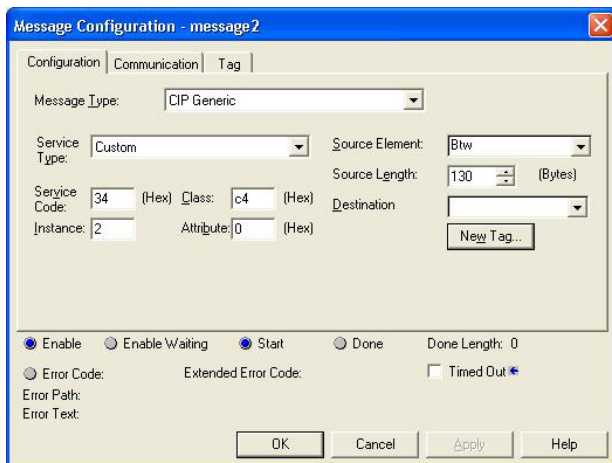
1. In RSLogix 5000 software, create a MSG instruction.
2. For the Message Type, select CIP Generic.
3. For the Service Type, select Custom.

Use the following parameters.

<b>MSG Parameter</b>	<b>Block Transfer Read</b>
Service code (hex)	34
Class (hex)	C4
Instance	2
Attribute	N/A

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## Message Confirmation Information



The Source element is an array tag of type INT that contains the offset in the block transfer write data table where the data is to be written, and the data itself.

The first word of this array is the offset of the data in the block transfer read data table, calculated as follows:

offset =  $1024 * \text{rack} + (\text{I/O group} * 2 + \text{slot}) * 64 + \text{word offset in BTW}$   
 where the rack number is in decimal.

### EXAMPLE

The offset for the start of the block transfer write data for a module at rack 1, I/O group 7, slot 1 is offset =  $1024 * 1 + (7 * 2 + 1) * 64 = 1984$ .

The rest of the array contains the data to be written. The Source Length is  $2 + 2 * \text{number of words to write}$ .

To write 64 words of BTW data, the Source Length is  $2 + 2 * 64 = 130$ .

The Destination can be left blank. If you are using this method to send block transfer write data to the module, make sure that the block transfer data for the module is not mapped to a numeric tag.



## **Process Remote I/O (RIO) Communication Interface Module, Firmware Revision 2.2**

This firmware revision is compatible with the new SRAM chip in the 1757-ABRIO module.

## **Process Remote I/O (RIO) Communication Interface Module, Firmware Revision 2.1**

This firmware revision provides the following updates:

- Support for all block transfer modules through a generic module - you can communicate to any module that does block transferring.
- Baud rate changes can be made online—you can change rates on the network to maximize communication and use to troubleshoot.
- Racks can be added/deleted online—you can configure their network in sections, if desired.

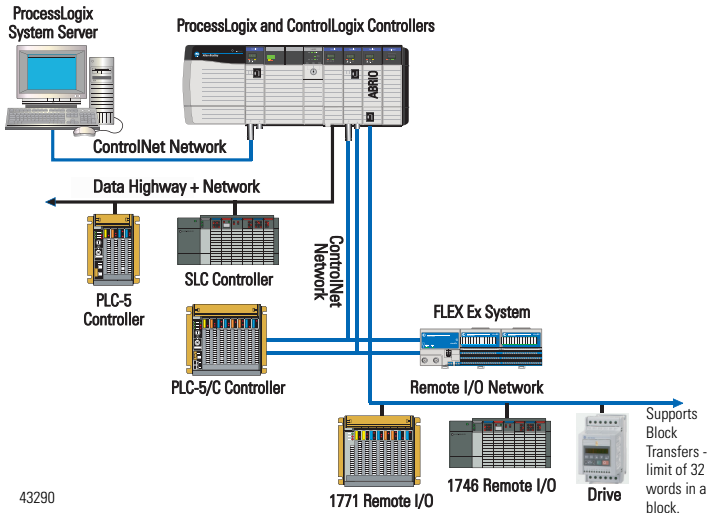
Refer to Process Remote I/O (RIO) Communication Interface Module User Manual, publication [1757-UM007](#), for more details.

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## Process Remote I/O (RIO) Communication Interface Module

The 1757-ABRIO module lets Rockwell Automation controllers communicate with Allen-Bradley remote I/O. The module acts as a remote I/O scanner. The module facilitates connection to analog and discrete I/O devices as well as any block transfer modules.

### 1757-ABRIO Module Example Topology



As a remote I/O scanner, the module:

- scans 1771 racks with rack numbers from 1...37 octal.
- supports baud rates of 57.6, 115.2, and 230.4 Kbps.
- supports up to 32 adapters with any mix of full/partial racks.
- automatically manages and performs block transfers, update time can be defined for each block transfer.
- provides full diagnostic counters for alarms and maintenance.
- automatically performs scaling of raw analog data.
- supports scheduled connections to update digital data with a ControlLogix processor.

- implements a watchdog timer in the module's hardware.

If the firmware does not trigger the watchdog within the time-out period, the watchdog times out and places the module into the configured safe failure state.

- automatically provides fault/fail safe commands to I/O and controller.
- implements a jabber inhibit timer.

If the network transmitter is on longer than 150% of the longest network frame time, the transmitter is forced off and places the module into the configured safe failure state.

- supports firmware updates by using the Nettles software or the ControlFLASH software.
- supports direct DDE/OPC data access.
- provides support for the Rockwell Automation 1770-HT1, 1770-HT8, and 1770-HT16 HART interface products.
- provides HART command set for calibration and diagnostics.

## **RSLinx Requirements**

The AbRioCfg software program requires the RSLinx OEM software or later. You cannot use the RSLinx Lite software. To access the module by using OPC or DDE, you must have RSLinx 2.31 software, version 2.31 or later.

If you are using ProcessLogix software, refer to the R510.0 Server Installation Instructions, publication [1757-IN951](#), to determine the appropriate RSLinx software version for your release.

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### Updating the 1757-ABRIO Module Firmware

The 1757-ABRIO module supports firmware upgrades by using ControlFLASH or NTools (ProcessLogix) software utilities. ControlLogix systems use ControlFLASH software to update the module firmware. The firmware revision is displayed on the 1757-ABRIO module four-character display when you apply power to the module.

For ProcessLogix users, if your 1757-ABRIO module revision is:

- 1.2 or earlier, use the ControlFLASH software to update the module firmware.
- later than 1.2, use the NTools utility to update the module firmware.

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**IMPORTANT**

We ship the module with the latest firmware installed. You do not need to download firmware to the module when you receive it.

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### Using the ControlFLASH Software

Use the following procedure to update the module firmware by using the ControlFLASH software.

1. Insert the ABRIO CD.
2. From the Start menu, choose Run.
3. Enter this path or browse to:  
D: (or your CD-ROM drive letter)\ControlFLASH\setup.exe
4. Click OK.
5. At the Welcome to ControlFLASH Setup dialog box, click Next.
6. Click Yes to accept the License Agreement.
7. Click Next to accept the default location.
8. Follow these steps at the Setup Complete dialog box.
  - a. Uncheck the Yes, I want to view the README file checkbox.
  - b. Check the Yes, I want to launch ControlFLASH checkbox.
  - c. Click Finish.

9. At the Welcome to ControlFLASH dialog box, click Next.
10. Click 1757-ABRIO and click Next.
11. Expand the RSLinx Tree dialog to the location of the 1757-ABRIO module you wish to upgrade.
12. Select the module icon and click OK.
13. Confirm new revision for this update and click Next.
14. At the Summary dialog box, click Finish.
15. Click Yes to confirm the upgrade.
16. Click OK.

If this update is successful, the Update Status dialog box displays 'Update Complete' in green. Verify this new firmware update before using the target device in its intended application.

17. Click OK and then click Cancel at the Welcome to ControlFLASH Setup dialog box.
18. Click Yes to end the configuration session.

### **Using the NTools Utility with ProcessLogix Software**

On a ProcessLogix system, if the module firmware is at 1.2 or later, use the following procedure to update the module firmware by using the NTools utility.

1. On the ProcessLogix server, from the Start menu, choose Run.
2. Type `ntools -c -u`.
3. Click OK to launch the Network Tools application.
4. Click OK to acknowledge the warning about monitoring through Control Builder.
5. Click Resume to initiate a network scan.

6. Choose the appropriate CNB or ENET icon.
7. In the chassis graphic, choose the module to be updated.
8. Click Firmware and then click Yes to acknowledge the warning.
9. Navigate to the directory: D: (or your CD-ROM drive letter)\abrio\Firmware\_NTtools.
10. Choose the appropriate .nvs file.
11. Click Open and click Yes to confirm.
12. Wait for the software to install.

The Status field in the lower portion of the Network Tools dialog box tracks the progress.

13. Click OK to acknowledge that the load completes with no errors.

### **Additional Resources**

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

## Notes:

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## Rockwell Automation Support

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

## Installation Assistance

If you experience a problem 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 product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the <a href="#">Worldwide Locator</a> at <a href="http://www.rockwellautomation.com/support/americas/phone_en.html">http://www.rockwellautomation.com/support/americas/phone_en.html</a> , or contact your local Rockwell Automation representative.

## New Product Satisfaction Return

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

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

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