

## **Measurement & Automation Explorer Help for PXI**

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This help file explains how to use Measurement & Automation Explorer (MAX) to configure your PXI system.

For more information about this help file, refer to the following topics:

**Using Help** 

**Important Information** 

Technical Support and Professional Services

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# **Using Help**

Conventions

**Navigating Help** 

Searching Help

Printing Help File Topics

#### **Conventions**

This help file uses the following formatting and typographical conventions:

The » symbol leads you through nested menu items and dialog box options to a final action. The sequence File»Page Setup»Options directs you to pull down the File menu,

select the Page Setup item, and select Options from the last dialog box.

This icon denotes a note, which alerts you to important information.

**bold** Bold text denotes items that you must select or click in the software, such as menu items

and dialog box options. Bold text also denotes parameter names.

green Underlined text in this color denotes a link to a help topic, help file, or Web address.

italic Italic text denotes variables, emphasis, cross-references, or an introduction to a key

concept. Italic text also denotes text that is a placeholder for a word or value that you must

supply.

monospace Text in this font denotes text or characters that you should enter from the keyboard,

sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines,

device names, functions, operations, variables, filenames, and extensions.

## **Navigating Help (Windows Only)**

To navigate this help file, use the **Contents**, **Index**, and **Search** tabs to the left of this window or use the following toolbar buttons located above the tabs:

- **Hide**—Hides the navigation pane from view.
- **Locate**—Locates the currently displayed topic in the **Contents** tab, allowing you to view related topics.
- Back—Displays the previously viewed topic.
- **Forward**—Displays the topic you viewed before clicking the **Back** button.
- **Options**—Displays a list of commands and viewing options for the help file.

## **Searching Help (Windows Only)**

Use the **Search** tab to the left of this window to locate content in this help file. If you want to search for words in a certain order, such as "related documentation," add quotation marks around the search words as shown in the example. Searching for terms on the **Search** tab allows you to quickly locate specific information and information in topics that are not included on the **Contents** tab.

#### **Wildcards**

You also can search using asterisk (\*) or question mark (?) wildcards. Use the asterisk wildcard to return topics that contain a certain string. For example, a search for "prog\*" lists topics that contain the words "program," "programmatically," "progress," and so on.

Use the question mark wildcard as a substitute for a single character in a search term. For example, "?ext" lists topics that contain the words "next," "text," and so on.



**Note** Wildcard searching will not work on Simplified Chinese, Traditional Chinese, Japanese, and Korean systems.

## **Nested Expressions**

Use nested expressions to combine searches to further refine a search. You can use Boolean expressions and wildcards in a nested expression. For example, "example AND (program OR VI)" lists topics that contain "example program" or "example VI." You cannot nest expressions more than five levels.

#### **Boolean Expressions**

Click the **b** button to add Boolean expressions to a search. The following Boolean operators are available:

- AND (default)—Returns topics that contain both search terms. You do not need to specify this operator unless you are using nested expressions.
- **OR**—Returns topics that contain either the first or second term.
- **NOT**—Returns topics that contain the first term without the second term.
- **NEAR**—Returns topics that contain both terms within eight words of each other.

# **Search Options**

Use the following checkboxes on the **Search** tab to customize a search:

- **Search previous results**—Narrows the results from a search that returned too many topics. You must remove the checkmark from this checkbox to search all topics.
- Match similar words—Broadens a search to return topics that contain words similar to the search terms. For example, a search for "program" lists topics that include the words "programs," "programming," and so on.
- **Search titles only**—Searches only in the titles of topics.

## **Printing Help File Topics (Windows Only)**

Complete the following steps to print an entire book from the **Contents** tab:

- 1. Right-click the book.
- 2. Select **Print** from the shortcut menu to display the **Print Topics** dialog box.
- 3. Select the **Print the selected heading and all subtopics** option.



**Note** Select **Print the selected topic** if you want to print the single topic you have selected in the **Contents** tab.

4. Click the **OK** button.

## **Printing PDF Documents**

This help file may contain links to PDF documents. To print PDF documents, click the print button located on the Adobe Acrobat Viewer toolbar.

#### **PXI System Configuration**

Configuring your PXI system requires two steps: identifying the PXI system controller and identifying any PXI chassis. You must configure your PXI system to allow geographic addressing (such as chassis and slot numbering) of your PXI devices.

Identifying the PXI System

Identifying a PXI Chassis

Identifying a PXI Chassis Connected by a Third-Party Bridge

Renumbering a Chassis

**Deleting Identifications** 

**Configuring PXI Triggers** 

Configuring the SCXI Subsystem of a PXI Chassis

#### **Identifying the PXI System**

Your PXI system starts in a nonconfigured state. When you expand **Devices & Interfaces** in MAX for the first time, you should see your PXI system represented as **PXI System (Unidentified)**, except on a PXI Express system, where it should be auto-identified.

To identify your PXI system controller, right-click **PXI System** and choose the appropriate PXI controller model from the device list in the **Identify As»** menu. If your PXI System uses a remote controller (that is, the PXI system controller is a PC), select **External PC**. If the controller model is not listed, select **Other...** and browse for the controller.ini file that contains the appropriate information for your PXI controller.



**Note** If you do not have PXI in your system, your PXI system will be empty, and you can identify your PXI system controller as an external PC. Right-click **PXI System** and choose **External PC**. If you extend your computer later with a PXI chassis via a PCI-to-PCI bridging solution such as a National Instruments MXI-4 bridge, you can configure your PXI system and devices then.

#### **Identifying a PXI Chassis**

MAX supports single-chassis or multiple-chassis configurations, and you must identify each chassis separately.

When using a National Instruments system controller (remote or embedded), all connected PXI chassis are detected and displayed in the configuration tree under the PXI system node. Some chassis are in nonconfigured state by default and must be identified, while the PXI software auto-identifies other chassis (including all PXI Express chassis).

To identify a PXI chassis, right-click **Chassis (Unidentified)** and choose the appropriate chassis type from the chassis list in the **Identify As»** menu. You can also identify a PXI chassis by selecting the chassis and the appropriate chassis type from the drop-down menu in the **Slot View** in the right pane.

After a chassis is identified, MAX assigns the first available number starting from 1 to the chassis. You can renumber the chassis after it has been identified by right-clicking the chassis and choosing **Renumber**.

# Identifying a PXI Chassis Connected by a Third-Party Bridge

If your PXI system uses a third-party bridging solution, MAX cannot detect the presence of a PXI chassis automatically. To identify a PXI chassis connected by a third-party bridge, complete the following steps.

- 1. Right-click the **PXI System** node (such as **PXI System (...)**) and select **Show PXI Buses**. Every PXI/PCI bus should now be displayed underneath your PXI system.
- 2. Find the PXI bus node that represents the bus segment used for your PXI chassis backplane. If the missing PXI chassis spans multiple buses, select the bus that represents the first segment of that chassis backplane. Right-click the PXI bus and select Identify Bus as Chassis to create a new nonconfigured chassis for the PXI bus. Follow the procedures in Identifying a PXI Chassis to identify this new nonconfigured PXI chassis.

You can hide the PXI bus objects again by right-clicking the PXI System node and selecting **Show PXI Buses** to uncheck the option. By default, MAX does not show PXI buses in your PXI system.

## **Renumbering a Chassis**

In MAX, right-click the chassis you want to renumber and select **Renumber**. In the dialog, enter a new chassis number from 0 to 1024 that does not conflict with other chassis numbers in the PXI system.

## **Deleting Identifications**

Right-click the **PXI System** node (such as **PXI System (...)**) in the configuration tree and select **Remove All Identifications**. If you accept the pop-up warning, the PXI system reverts to a nonconfigured state. Follow the procedures in <u>Identifying the PXI System</u> and <u>Identifying a PXI Chassis</u> to reconfigure your PXI system.

#### **Configuring PXI Triggers**

You can reserve trigger lines in your National Instruments PXI system to prevent software that uses National Instruments components from using certain lines. You may need to reserve trigger lines when you have a PXI device that uses predetermined triggers. For more information about why trigger reservation may be necessary, see <a href="What is Trigger Reservation">What is Trigger Reservation</a>, and Why is it Necessary? To reserve triggers in a PXI chassis, complete the following steps:

- 1. Configure your PXI system by following the procedures in <u>Identifying the PXI System</u> and <u>Identifying a PXI Chassis</u>.
- 2. Select the PXI chassis node that contains the trigger lines you want to reserve. In the right pane, select the **Triggers** tab, which displays a checkbox for each trigger line in your chassis.
- 3. Check each line you want to reserve and click **Save** to apply and save your changes.

For more detailed information, see <u>KnowledgeBase 3TJDOND8: Using</u> <u>PXI Timing and Triggering Functionality</u>.

#### What Are PXI Triggers?

PXI triggers are signals that are often used to synchronize events between devices in a chassis. These signals are asserted or de-asserted by devices in the chassis and are passed to other devices through trigger lines on the backplane of the chassis. Each trigger bus on a chassis backplane contains eight PXI trigger lines (PXI\_Trig0 through PXI\_Trig7). Each slot in a PXI chassis is connected to a single trigger bus and can transmit and receive signals over the trigger lines from any other device on the same bus. Most chassis contain only a single trigger bus, but some chassis, such as the NI PXI-1045, have multiple trigger buses.

## **Chassis with a Single Trigger Bus**

In chassis containing only a single bus, all slots share the same trigger bus and can communicate to each other using this bus. For example, the NI PXI-1042 chassis has one trigger bus, and all slots (1-8) reside on this trigger bus. In this situation, a device in any slot can use the backplane to send triggers to a device in any other slot.

## **Chassis with Multiple Trigger Buses**

Normally, if a chassis has more than one trigger bus, a device in a slot connected to one trigger bus cannot use the trigger lines to communicate to a device connected to another trigger bus in the same chassis. For example, the NI PXI-1045 chassis has 18 slots and three trigger buses. In this chassis the slots are assigned to the trigger buses as follows: trigger bus 1: slots 1-6; trigger bus 2: slots 7-12; and trigger bus 3: slots 13-18. Without further configuration, the NI PXI-1045 trigger buses function like three separate single-segment chassis.



**Note** Some multibus chassis such as the NI PXI-1045 can forward trigger signals between buses. Many National Instruments products such as NI-DAQmx will, when necessary, dynamically route trigger signals between the separate trigger buses in these chassis. Routes can also be statically configured for compatibility with legacy programs using the chassis' **Triggers** pane in MAX.



**Note** Refer to the <u>KnowledgeBase</u> article 32GFMIWD, *Routing PXI Trigger Lines Across the Buses of Multisegment PXI Chassis*, to learn more about trigger routing in multisegment PXI chassis.

#### What Is Trigger Reservation, and Why Is It Necessary?

If multiple devices attempt to use the same trigger line simultaneously, hardware damage can occur. Beginning with LabVIEW 7.0, NI-DAQmx 7.0, and NI-VISA 3.0, National Instruments software can track which lines the hardware is using and automatically use any available trigger lines; however, trigger lines used by components from another vendor or old software cannot be tracked automatically by National Instruments software. By reserving a trigger line in MAX, you can tell National Instruments software that a particular trigger line is in use.

#### **Manually Reserving Triggers in MAX**

Use MAX to maintain trigger reservations for each of your PXI chassis. By expanding an entire identified PXI System under **Devices and Interfaces**, you can see all the chassis in your system. To change and view each chassis' static trigger reservations, follow these steps:

- 1. Under **Devices and Interfaces**, select the chassis containing the trigger lines you want to reserve.
- 2. Select the **Triggers** tab in the right pane.
- 3. Check the trigger lines you want to reserve.
- 4. Click the **Save** button to apply and save your changes.

After saving the settings, any lines selected to be statically reserved will not be used by current National Instruments components, so legacy components or third-party components can safely use the lines.

## **Programmatically Reserving Triggers in VISA**

Programmatically reserving triggers is possible using NI-VISA 3.0 and later on a per-instrument basis. After opening a VISA session to a PXI INSTR resource, you can reserve a trigger line on the trigger bus connected to the device. Additionally, trigger routing and reservation is available through a PXI BACKPLANE resource, which is available in NI-VISA 3.1 and later. For more information, refer to your NI-VISA documentation.

#### Configuring the SCXI Subsystem of a PXI Chassis

For a PXI/SCXI combination chassis, such as the PXI-1050 or PXI-1052, you must also configure the chassis for use with NI-DAQ. For NI-DAQmx, right-click **Devices and Interfaces»NI-DAQmx Devices** and choose **Create New NI-DAQmx Device»NI-DAQmx SCXI Chassis**. After selecting the appropriate chassis, follow the instructions provided. For traditional NI-DAQ, right-click **Devices and Interfaces»Traditional NI-DAQ Devices** and choose **Add SCXI Chassis...**, selecting the appropriate chassis.

#### **Remote PXI System Configuration**

Remote PXI system configuration is similar to configuring your local PXI system. First, install PXI Services on your RT target (refer to *Downloading Software* for information on how to update your software). Once the RT target has been updated and rebooted, expand **Devices & Interfaces** under your RT target and follow the procedures in <u>Identifying the PXI System</u> and <u>Identifying a PXI Chassis</u>.



Note To learn more about configuring a LabVIEW Real-Time system, refer to the <u>LabVIEW</u>
Real-Time Target Configuration Tutorial in MAX at Help»Help Topics»Remote Systems»MAX
Remote Systems Help»LabVIEW Real-Time Target Configuration.

## **PXI Basics**

**PXI System Basics** 

**PXI Chassis Basics** 

**PXI Bus Basics** 

## **PXI System Basics**

#### How do I use MAX with my PXI system?

The PXI system shows a hierarchy of all PXI chassis and PXI devices in your system. You can use MAX to configure your PXI system by identifying what type of controller you are using and each chassis in your system. If you have a desktop PC connected to a PXI chassis via a PCI-to-PCI bridging solution such as a National Instruments MXI-4 bridge, you must identify your PXI system controller as an external PC.

## What if I don't have PXI in my system?

For desktop PCs not connected to a PXI chassis, your PXI system will be empty, and you can identify your PXI system controller as an external PC. If you extend your computer later with a PXI chassis via a PCI-to-PCI bridging solution such as a National Instruments MXI-4 bridge, you can configure your PXI system and devices then.

## What can I do at the PXI system level?

You can identify your PXI system controller, communicate with devices, delete all identifications, or show hidden PXI buses in your system.

# What do you want to do?

- ▶ Identify my PXI system controller
- ▶ Communicate with my device
- ▶ Delete all identifications
- ▶ Show PXI buses

#### **PXI Chassis Basics**

#### How do I use MAX with my PXI chassis?

To configure your PXI system, you must identify each PXI chassis. (PXI Express chassis are automatically identified.) Identifying your chassis enables features such as slot identification, geographic addressing, and trigger routing. MAX automatically detects all PXI chassis connected by National Instruments MXI bridging kits, but cannot detect the PXI chassis model.

For third-party bridging solutions, you must show PXI buses at the PXI system level to see the bus that represents the chassis. Then you must create a chassis for that bus. Refer to PXI System Basics and PXI Bus Basics for more information.

#### What can I do at the PXI chassis level?

You can identify your PXI chassis type, view and communicate with devices, renumber the chassis, delete the chassis, and reserve triggers in the chassis.

## What do you want to do?

- ▶ Identify my PXI chassis
- ▶ View and communicate with my device
- ▶ Renumber my PXI chassis
- ▶ Delete my PXI chassis
- ▶ Configure triggers in my PXI chassis
- ▶ Configure my SCXI subsystem

#### **PXI Bus Basics**

#### How do I use MAX with my PXI buses?

PXI buses represent the internal PCI-to-PCI bridge hierarchy for your PXI system. The configuration tree represents the buses, using information about which buses are subordinates of other buses. Any bus identified as a chassis (such as a chassis connected by National Instruments MXI bridging solutions) is now shown as a chassis, rather than a bus. You must identify third-party PCI-to-PCI bridges that connect to PXI chassis before configuring the chassis. You may see other PXI buses in your PXI system. These buses are PCI-to-PCI bridges internal to your computer or bridges on multifunction devices, and should not be identified as chassis.

## What can I do at the PXI bus level?

You can identify your PXI bus as a chassis.

# What do you want to do?

▶ Identify my PXI bus as a chassis

## **Troubleshooting**

# Why do my VISA instruments have "Unknown" chassis and slot numbers?

You have not properly configured your PXI system. You must correctly identify the PXI system controller and chassis type before geographic addressing such as chassis and slot number is enabled. Follow the procedures in <u>Identifying the PXI System</u> and <u>Identifying a PXI Chassis</u> to correctly configure your PXI system.

### Why is my PXI system "Unidentified"?

You have not properly configured your PXI system. Refer to <u>Identifying</u> the PXI System to correctly configure your PXI system.

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