

NI Switches Help

January 2008, 370388V-01

This help file contains fundamental and advanced concepts necessary for using National Instruments switch modules and the NI-SWITCH instrument driver. In addition to device-specific information, this help file contains getting started steps for creating an application using LabVIEW, LabWindows™/CVI™, Microsoft Visual C++, and Microsoft Visual Basic and includes LabVIEW and C/CVI/VB programming references.

For information about programming your switch module with the NI-DAQmx API, refer to the *NI-DAQmx Help*.

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

Using Help

Related Documentation

<u>Glossary</u>

Important Information

Technical Support and Professional Services

To comment on National Instruments documentation, refer to the <u>National</u> <u>Instruments Web site</u>.

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Related Documentation

Most documents also are available as PDFs. You must have Adobe Reader with Search and Accessibility 5.0.5 or later installed to view the PDFs. Refer to the <u>Adobe Systems Incorporated Web site</u> at www.adobe.com to download Adobe Reader. Refer to the <u>National</u> <u>Instruments Product Manuals Library</u> at ni.com/manuals for updated documentation resources.

The following documentation resources contain information that you may find helpful as you use this help file:

- NI-SWITCH Readme File
- NI-SWITCH Instrument Driver Quick Reference
- NI Switches Getting Started Guide

- <u>NI PXI-2501 Specifications</u>
- <u>NI TB-2605 Installation Instructions</u>
- <u>NI TB-2606 Installation Instructions</u>
- <u>NI TBX-68S Installation Instructions</u>

- <u>NI PXI-2503 Specifications</u>
- <u>NI TB-2605 Installation Instructions</u>
- <u>NI TB-2606 Installation Instructions</u>
- <u>NI TBX-68S Installation Instructions</u>

- <u>NI PXI-2527 Specifications</u>
- NI TB-2627 Installation Instructions

- <u>NI PXI-2529 Specifications</u>
- <u>NI TB-2634 Installation Instructions</u>
- <u>NI TB-2635 Installation Instructions</u>
- <u>NI TB-2636 Installation Instructions</u>

- <u>NI PXI-2530 Specifications</u>
- <u>NI TB-2630 Installation Instructions</u>
- NI TB-2631 Installation Instructions
- NI TB-2632 Installation Instructions

- <u>NI PXI-2532 Specifications</u>
- <u>NI SCB-264X Installation Instructions</u>
- <u>NI TB-2640 Installation Instructions</u>
- NI TB-2641 Installation Instructions
- <u>NI TB-2642 Installation Instructions</u>
- <u>NI TB-2643 Installation Instructions</u>
- <u>NI TB-2644 Installation Instructions</u>
- <u>NI TB-2645 Installation Instructions</u>

<u>NI PXI-2533 Specifications</u>

<u>NI PXI-2534 Specifications</u>

<u>NI PXI-2535 Specifications</u>

<u>NI PXI-2536 Specifications</u>

<u>NI PXI-2545 Specifications</u>

<u>NI PXI-2546 Specifications</u>

<u>NI PXI-2547 Specifications</u>

<u>NI PXI-2548 Specifications</u>

<u>NI PXI-2549 Specifications</u>

<u>NI PXI-2554 Specifications</u>

<u>NI PXI-2555 Specifications</u>

<u>NI PXI-2556 Specifications</u>

<u>NI PXI-2557 Specifications</u>

<u>NI PXI-2558 Specifications</u>

<u>NI PXI-2559 Specifications</u>

<u>NI PXI-2564 Specifications</u>

<u>NI PXI-2565 Specifications</u>

- <u>NI PXI-2566 Specifications</u>
- NI TB-2666 Installation Instructions

<u>NI PXI-2567 Specifications</u>

<u>NI PXI-2568 Specifications</u>

- <u>NI PXI-2569 Specifications</u>
- LFH200 Cable Installation Instructions

- <u>NI PXI-2570 Specifications</u>
- LFH200 Cable Installation Instructions

- <u>NI PXI-2575 Specifications</u>
- LFH200 Cable Installation Instructions

- <u>NI PXI-2576 Specifications</u>
- NI TB-2676 Installation Instructions
- LFH160 Cable Installation Instructions

<u>NI PXI-2584 Specifications</u>

- <u>NI PXI-2585 Specifications</u>
- NI PXI-2585/2586 Connector and Backshell Kit Installation Guide

- <u>NI PXI-2586 Specifications</u>
- NI PXI-2585/2586 Connector and Backshell Kit Installation Guide

<u>NI PXI-2590 Specifications</u>

<u>NI PXI-2591 Specifications</u>

<u>NI PXI-2593 Specifications</u>

<u>NI PXI-2594 Specifications</u>

<u>NI PXI-2595 Specifications</u>

<u>NI PXI-2596 Specifications</u>

<u>NI PXI-2597 Specifications</u>

<u>NI PXI-2598 Specifications</u>

<u>NI PXI-2599 Specifications</u>

- <u>NI SCXI-1127 Specifications</u>
- NI SCXI-1331 Installation Instructions
- NI SCXI-1332 Installation Instructions

- NI SCXI-1128 Specifications
- NI SCXI-1331 Installation Instructions
- NI SCXI-1332 Installation Instructions

- <u>NI SCXI-1129 Specifications</u>
- <u>NI SCXI-1333 Installation Instructions</u>
- NI SCXI-1334 Installation Instructions
- NI SCXI-1335 Installation Instructions
- <u>NI SCXI-1336 Installation Instructions</u>
- <u>NI SCXI-1337 Installation Instructions</u>
- <u>NI SCXI-1339 Installation Instructions</u>
- NI SCXI-1384K Installation Instructions

- <u>NI SCXI-1130 Specifications</u>
- <u>NI SCXI-1377 Installation Instructions</u>
- NI SCXI-1378 Installation Instructions
- <u>NI SCXI-1379 Installation Instructions</u>

- <u>NI SCXI-1160 Specifications</u>
- NI SCXI-1324 Installation Instructions

- <u>NI SCXI-1161 Specifications</u>
- <u>NI TBX-24F Installation Instructions</u>

NI SCXI-1163R

- <u>NI SCXI-1163R Specifications</u>
- NI SCXI-1326 Installation Instructions
- <u>NI ITBX-1326 Installation Instructions</u>

- <u>NI SCXI-1166 Specifications</u>
- NI SCXI-1366 Installation Instructions

<u>NI SCXI-1167 Specifications</u>

- <u>NI SCXI-1169 Specifications</u>
- LFH200 Cable Installation Instructions

- <u>NI SCXI-1175 Specifications</u>
- LFH200 Cable Installation Instructions

<u>NI SCXI-1190 Specifications</u>

NI SCXI-1191 Specifications

NI SCXI-1192 Specifications

<u>NI SCXI-1193 Specifications</u>

<u>NI SCXI-1194 Specifications</u>

<u>NI SCXI-1195 Specifications</u>

NI Switch Controllers/Adapters

NI 1357/1358/1359 SCXI Controller/Adapter Kit Installation Guide

Using Help

<u>Conventions</u> <u>Navigating Help</u> <u>Searching Help</u> <u>Printing Help File Topics</u>

Conventions

This help file uses the following formatting and typographical conventions:

- <> Angle brackets that contain numbers separated by an ellipsis represent a range of values associated with a bit or signal name—for example, AO<0..3>.
- [] Square brackets enclose optional items—for example, [response].
- 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.
- The symbol indicates that the following text applies only to a specific product, a specific operating system, or a specific software version.
- This icon denotes a tip, which alerts you to advisory information.
- This icon denotes a note, which alerts you to important information.
- This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.
- **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.
- **dark red** Text in this color denotes a caution.
- 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.
- monospace Bold text in this font denotes the messages and responses that the computer automatically prints to the screen. This font also emphasizes lines of code that are different from the other examples.

monospace Italic text in this font denotes text that is a placeholder for a *italic* word or value that you must supply.

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 **•** 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.

Fundamentals

This book contains information about the terminology and concepts related to switches and switching applications.

- <u>Relay Forms</u>
- Relay Types
- <u>Topologies</u>
- <u>X-Wire Switching</u>
- General Switching Considerations
- <u>RF Switching Considerations</u>
- <u>Scanning</u>

Relay Forms

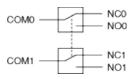
Relays are classified by their number of poles and number of throws. The pole of a relay is the terminal common to every path. Each position where the pole can connect is called a throw. A relay can be made of *n* poles and *m* throws. For example, a single-pole single-throw (SPST) relay has one pole and one throw, as illustrated in the following figure.

-7-

A single-pole double-throw (SPDT) relay has one pole and two throws. Based on the default position of the pole, one throw is considered normally open (NO) while the other is normally closed (NC). The following figure illustrates a SPDT relay.



A double-pole double-throw (DPDT) relay has two poles, each with two simultaneously controlled throws, as illustrated in the following figure.



An RF transfer switch (DPDT) has four ports (1–4) and two states (reset and set). In the reset state, port 1 is connected to port 2 and port 3 is connected to port 4. In the set state, port 1 is connected to port 3 and port 2 is connected port 4. The following figure illustrates the reset and set states of an RF transfer switch.



Relays are then classified into forms. Relay forms are categorized by the number of poles and throws as well as the default position of the relay. The following table lists three common relay forms.

Form	Symbol	Description	
Form A		SPST relays with a default state of normally open.	
Form B		SPST relays with a default state of normally closed.	
Form C	NC NO	SPDT relays that break the connection with one throw before making contact with the other (break-	

	before-make).

Relay Types

NI switch modules use the following relay types:

- Electromechanical Relays
- Solid-State Relays
- FET Switches

To determine the relay type(s) of a specific switch module, refer to the <u>specifications</u> for that switch module.

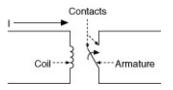
Electromechanical Relays

NI uses the following types of electromechanical relays:

- <u>Armature Relays</u>
 - Transfer Switches
- Reed Relays

Armature Relays

Armature relays are a type of <u>electromechanical relay</u> made of coils, an armature mechanism, and contacts. When the coil is energized, the induced magnetic field moves the armature. This movement opens or closes the contacts. If your switch module uses armature relays, consider the factors that affect <u>relay life</u>.

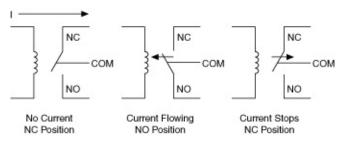


There are two types of armature relays, latching and nonlatching.

Nonlatching

A nonlatching relay has an initial position of normally closed (NC). This position is maintained by the force of a spring or permanent magnet while no current flows. The normally open (NO) contact is maintained by the force of a magnetic field while current flows through the coil. When the current stops, the relay reverts to its initial NC position.

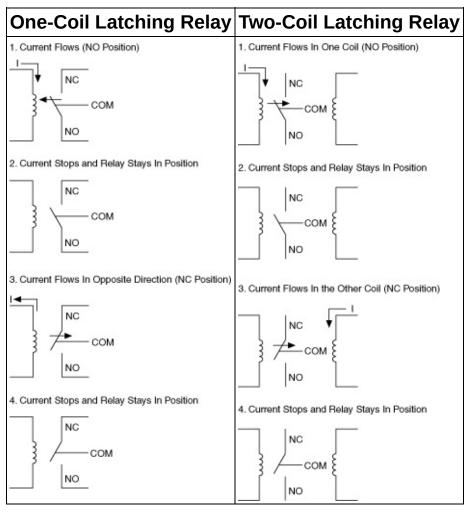
Nonlatching armature relays are useful in control applications when the switch must return to a known state if power is lost.



Latching

A latching relay can have one or two coils. Latching relays have no default position and remain in their last position when the drive current stops flowing. While the relays themselves may be latching, their reset position in a module is based on the control circuitry and software (NI-SWITCH resets all relays on all modules during initialize and reset). Latching relays are useful in applications where power consumption and dissipation must be limited because, once actuated, the relays require no current flow to maintain their position.

In one-coil latching, the direction of current flow determines the position of the relay. In two-coil latching, the coil in which the current flows determines the position of the armature.



Transfer Switches

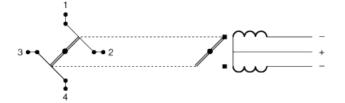
An RF transfer switch (DPDT) is a type of <u>armature</u> relay that is composed of four ports (1–4) in one of two states (reset and set). In the reset state, port 1 is connected to port 2 and port 3 is connected to port 4. In the set state, port 1 is connected to port 3 and port 2 is connected port 4. The reset and set states of an RF transfer switch are illustrated in the following figures:



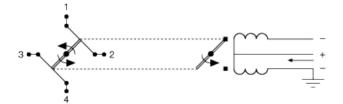
Transfer Switch Operation Cycle

The following figures illustrate the operation cycle of a transfer switch with 2-coil <u>latching</u>:

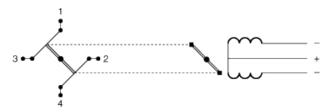
1. The transfer switch begins in the reset state.



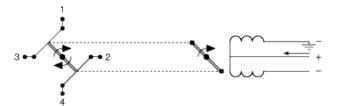
2. Current flows through the lower coil to change the transfer switch to the set state.



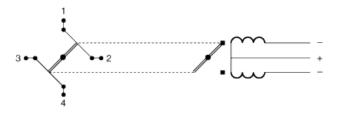
3. The transfer switch is now in the set state.



4. Current flows through the upper coil to change the transfer switch to the reset state.



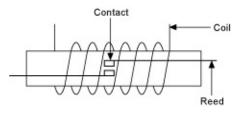
5. The transfer switch ends in the reset state.



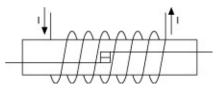
Reed Relays

Reed relays are a type of <u>electromechanical relay</u> composed of coils wrapped around reed switches. The reed switch has two overlapping ferromagnetic blades hermetically sealed within a glass capsule that is filled with an inert gas. When the coil is energized, the two reeds physically contact one another to complete a path through the relay. When the coil is deenergized, the spring force in the reeds pulls the reeds apart.

Open Reed Relay



Closed Reed Relay

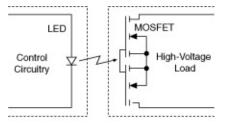


The reeds are generally smaller and therefore can actuate much faster than the armatures in <u>armature relays</u>. However, reeds are also more susceptible to damage from <u>arcing</u> than are armatures in armature relays. When a spark jumps across the contacts, it can melt a small section of the reed. If the contacts are still closed when the molten section resolidifies, the contacts may weld together. The spring force in the reeds is often insufficient to mechanically break the weld.

When using switch modules with reed relays, consider the effects of <u>switching capacitive loads</u> to <u>protect the reed relays</u>.

Solid-State Relays (SSR)

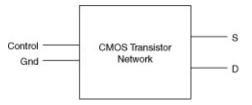
Solid-state relays incorporate an LED to control the gate of a photosensitive MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor). This relay structure provides an isolation barrier between the control circuitry and the load allowing the relay to switch high voltage. It takes about 1 ms (depending on the relay) for the LED to power on, and 0.5 ms for the LED to power off. These times restrict the switching speed of this relay, yet SSRs are faster than <u>electromechanical relays</u>.



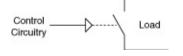
Mixed-Case Isolation Barrier

FET Switches

FET (Field-Effect Transistor) switches are made of several CMOS transistors. A voltage is applied to the control circuitry, which connects the source (S) and drain (D) of a transistor network (load circuit) as shown in the following figure.



There is no additional isolation between the control circuitry and the signal path, which restricts operation to low voltage, but allows very fast switching speeds.



Topologies

A switch topology is an organizational representation of the channels and relays on a switch module. Topologies often show the default connections for the relays on a module and label the channel names. Some switch modules can use multiple topologies or a variation of a topology. Some terminal blocks or accessories may force the switch module to use a given topology or set of topologies.

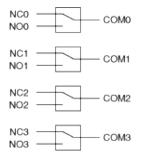
NI-SWITCH supports the following topologies:

- <u>General-Purpose</u>
- <u>Multiplexer</u>
- <u>Matrix</u>
- <u>Transfer Switches</u>

Refer to <u>Initialization</u> for more information about setting the topology of the switch module.

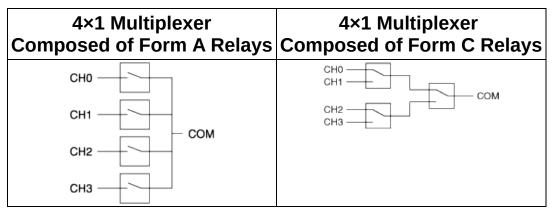
General-Purpose Topologies

General-purpose topologies consist of multiple isolated relays. Each channel of a general-purpose switch module can connect one input to one output. They are typically used to power on or power off devices such as motors, fans, and lights or to switch high-voltage or high-current signals.



Multiplexer

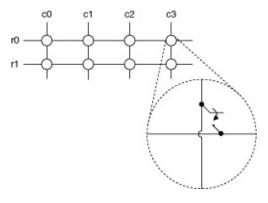
A multiplexer, or a mux, is a topology in which you can connect one input to multiple outputs or one output to multiple inputs. This topology is often used for <u>scanning</u> when you need to automatically connect a sequence of channels to a common line.



Matrix

A matrix is one of the most flexible switching configurations. Unlike a <u>multiplexer</u>, a matrix can connect multiple inputs to multiple outputs organized as columns and rows. You can connect any column to any number of rows and any row to any number of columns. At each intersection of a row and column, there is a switch. When the switch is closed, the row is connected to the column.

Matrix size is often described as M rows by N columns (M \times N). The following figure illustrates a 1-wire, 2 \times 4 matrix.



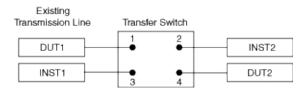
Transfer Switches

An RF transfer switch (DPDT) has four ports (1–4) and two states (reset and set). In the reset state, port 1 is connected to port 2 and port 3 is connected to port 4. In the set state, port 1 is connected to port 3 and port 2 is connected port 4.

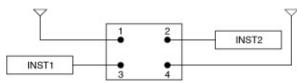
Using a Transfer Switch

The following figures illustrate example uses of a transfer switch.

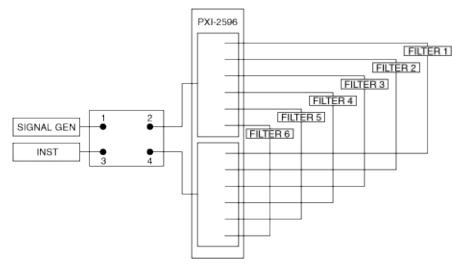
• Testing two DUTs with different instruments



• Testing antennas



• Testing multiple filters with the NI PXI-2596

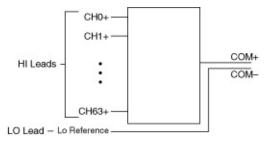


X-Wire Switching

NI switch modules are capable of switching one, two and/or four wires.

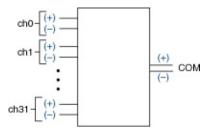
1-Wire

In 1-wire mode, you connect the HI leads to the relays and the LO leads to a common connection. All signals are referenced to this common connection. All NI <u>multiplexers</u> other than the <u>NI SCXI-1163R</u> can operate in 1-wire mode.



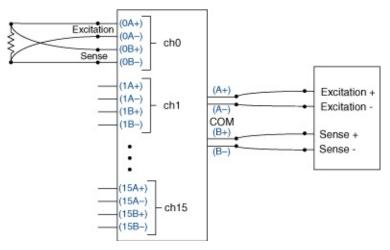
2-Wire

In 2-wire mode, you connect both positive and negative leads to the terminals of a channel.



4-Wire

4-wire mode is usually used for 4-wire resistance measurements. One channel (two leads) is used for the current excitation and another channel (two leads) is used for measuring the voltage drop (sense) across the resistor. For example, if you are in 4-wire mode with the NI SCXI-1127 and want to make a 4-wire resistance measurement on channel 6, the excitation current EX is on channel 6± and the measurement channel SENSE is on channel 22±. In software, select channel 6 to be scanned.



General Switching Considerations

This book contains information about concepts to consider when developing a switching application.

- <u>Contact Resistance</u>
- Relay Life
- Path Resistance
- Thermal EMF and Offset Voltage
- <u>Relay Operation</u>
- <u>Switching Inductive Loads</u>
- <u>Switching Capacitive Loads</u>
- <u>Switching Capacity</u>
- <u>Reed Relay Protection</u>

Contact Resistance

Contact resistance refers to the DC resistance through one set of closed contacts in a relay.

Relay Life

NI switches typically specify a conservative estimation of the expected life of the <u>electromechanical relay</u> components. Relay life is specified as a minimum number of cycles before the end of the relay life. One cycle is defined as the action of opening and closing the relay. The expected life is divided into two main categories: mechanical and electrical life.

Tip Some switch modules are capable of tracking relay usage using the <u>niSwitch Get Relay Count</u> VI or the <u>niSwitch_GetRelayCount</u> function. Refer to <u>relay count</u> for more information.

Mechanical Life

The contacts of mechanical relays wear with usage, and worn contacts have a higher contact resistance. The mechanical life specification is typically the number of switch cycles before the contact resistance rises above 1 Ω . This rating assumes no electrical load across contacts during actuation.

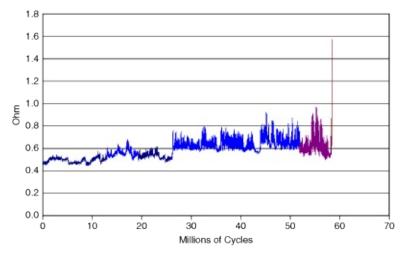
Electrical Life

Switching active electrical signals, especially high power signals, causes arcing across the relay contacts. This arcing produces pits on the contact surface and accelerates the contact wear described in Mechanical Life. The electrical life specification is the number of switch cycles, under load, before the contact resistance rises above 1 Ω .

Path Resistance

Path resistance is the resistance of a complete signal path from source to destination terminals on a switch module. The total resistance includes the resistance of PCB traces, relays, and connectors. Trace and connector resistance is generally stable, but relay <u>contact resistance</u> increases with use.

The following figure illustrates the typical path resistance of a switch module with a <u>mechanical life</u> of 50 million cycles.



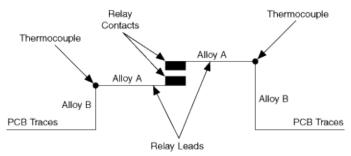
Thermal EMF and Offset Voltage

When two, dissimilar metals are joined a voltage is created. This voltage is known as the thermal electromotive force (EMF) or the Seebeck voltage. The Seebeck voltage is dependent on the temperature of the junction and the composition of the metals joined. The specific metal-to-metal junctions result in specific temperature coefficients (μ V/°C), also known as Seebeck coefficients. The following table lists the most common metals and their respective Seebeck coefficients.

Junction	µV/°C
Copper-Copper	<0.3
Copper-Gold	0.5
Copper-Silver	0.5
Copper-Brass	3
Copper-Nickel	10
Copper-Lead-Tin Solder	1-3
Copper-Aluminum	5
Copper-Kovar	40
Copper-Copper Oxide	>500

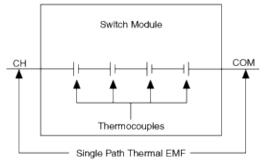
Thermal EMF in switches

The leads of electromechanical relays are usually composed of metal alloys, most often nickel-iron alloy, while the PCB of a switch module is usually composed of copper or copper alloy. The junction between these two, dissimilar metals creates a thermocouple, as illustrated in the following figure.

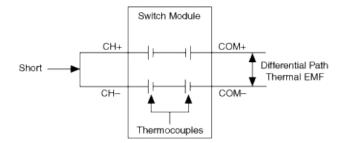


Note A thermocouple developed in a relay is dependent on the temperature of the junction. The temperature of a junction varies according to the ambient temperature, the number of relays activated, the air flow inside the switch module, and the types of switch modules located in the adjacent slots.

A signal path can transverse a single relay or multiple relays. The sum of all the thermocouples in a signal path is expressed as the thermal EMF. Thermal EMF can be specified as single path (single wire) or differential path thermal EMF. The following figure illustrates thermal EMF measured in a single path.



The following figure illustrates thermal EMF measured in a differential path.



Accuracy

When measuring voltage with a switch and a DMM, be sure to account for thermal EMF in the overall system accuracy calculation.

For example, if the DMM has an accuracy of 4 μV and the switch has a differential path thermal EMF of 3 μV , the overall system accuracy can be calculated as follows:

 $\sqrt{4^2 + 3^3} = 5 \ \mu V$

Thus, when measuring a 50 mV signal, the overall system accuracy is 0.01%.



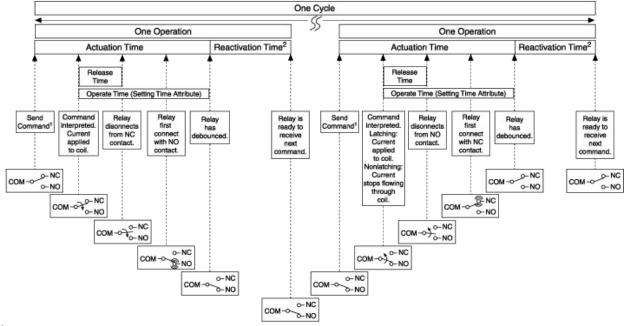
Note For information about thermal EMF and thermocouple measurement, refer to <u>Thermocouple Measurement</u>.

Relay Operation

- <u>Cycle Process</u>
- <u>Settling Time</u>
- <u>Relay Count</u>

Cycle Process

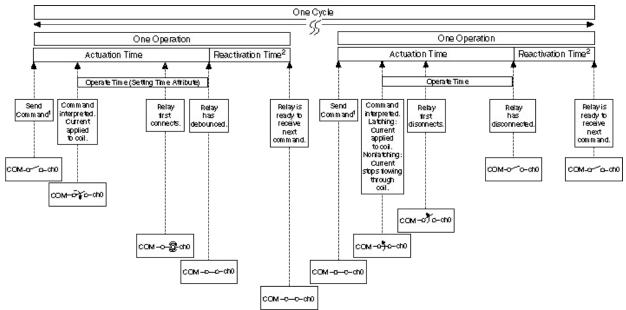
The following diagram represents the process an electromechanical SPDT general-purpose relay performs during a cycle.



¹The command can be from a software or hardware trigger.

²The SCXI-1192 is the only National Instruments switch with a significant reactivation time: 475 ms.

The following diagram represents the process an electromechanical SPST general-purpose relay performs during a cycle.



¹The command can be from a software or hardware trigger.

² The SCXI-1192 is the only National Instruments switch with a significant reactivation time: 475 ms.

For certain situations you may need to increase the default settling time.

Refer to <u>Adding Additional Settling Time</u> for more information on increasing the default settling time.

Settling Time

Settling time refers to the time required for a signal to reach a steady state after sending an actuation command to the relay. *Steady state* is determined by the required accuracy of the measurement. Highly accurate measurements require longer settling times than less accurate measurements.

Settling time is an important consideration for <u>solid-state relays</u> with high path resistance and R-C time constants.

For certain situations you may need to increase the default settling time. Refer to <u>Adding Additional Settling Time</u> for more information about increasing the default settling time.

Some switch modules apply additional settling time only when relays are closed, not when relays are opened.

The following switch modules apply additional settling time when relays are closed or opened:

- NI PXI-2501
- NI PXI-2503
- NI PXI-2527
- NI PXI-2529
- NI PXI-2530
- NI PXI-2532
- NI PXI-2545
- NI PXI-2546
- NI PXI-2547
- NI PXI-2548
- NI PXI-2549
- NI PXI-2554
- NI PXI-2555
- NI PXI-2556
- NI PXI-2557
- NI PXI-2558
- NI PXI-2559
- NI PXI-2564

- NI PXI-2565
- NI PXI-2566
- NI PXI-2567
- NI PXI-2568
- NI PXI-2569
- NI PXI-2570
- NI PXI-2575
- NI PXI-2576
- NI PXI-2584
- NI PXI-2585
- NI PXI-2586
- NI PXI-2590
- NI PXI-2591
- NI PXI-2593
- NI PXI-2594
- NI PXI-2595
- NI PXI-2596
- NI PXI-2597
- NI PXI-2598
- NI PXI-2599
- NI SCXI-1127
- NI SCXI-1128
- NI SCXI-1129
- NI SCXI-1130
- NI SCXI-1160
- NI SCXI-1161
- NI SCXI-1163R
- NI SCXI-1166
- NI SCXI-1167
- NI SCXI-1169
- NI SCXI-1175
- NI SCXI-1190
- NI SCXI-1191

- NI SCXI-1192
- NI SCXI-1193
- NI SCXI-1194
- NI SCXI-1195

Relay Count

Some switch modules are capable of tracking relay usage using the <u>niSwitch Get Relay Count</u> VI or the <u>niSwitch_GetRelayCount</u> function.

The following switch modules do not support relay counting:

- NI PXI-2501
- NI PXI-2503
- NI PXI-2565
- NI PXI-2590
- NI PXI-2591
- NI SCXI-1127
- NI SCXI-1128
- NI SCXI-1129
- NI SCXI-1160
- NI SCXI-1161
- NI SCXI-1163R
- NI SCXI-1190
- NI SCXI-1191
- NI SCXI-1192

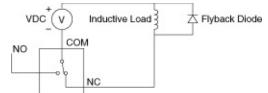
If you replace a failed relay, you can use the Switch Soft Front Panel to reset the relay count.

Switching Inductive Loads

When inductive loads are connected to the relays, a large counter electromotive force may occur when the relay actuates because of the energy stored in the load. These flyback voltages can severely damage the relay contacts and greatly shorten the <u>relay life</u>.

Limit these flyback voltages at your inductive load by installing a flyback diode for DC loads or a metal oxide varistor for AC loads, as shown in the following figure.

Contact Protection Using a Flyback Diode for DC Inductive Loads



Accounting for flyback voltages is particularly important for the <u>NI SCXI-1160/1161/1163R</u> modules. Refer to the switch module documentation for information on preparing the switch module to properly handle inductive loads.

Switching Capacitive Loads

Using <u>reed relays</u> to switch capacitive loads, especially with high voltages, requires special care. When a switch closes, a transient current flows to charge the capacitance. This inrush current may be substantially higher than the steady-state current through the system. Reed contact welding may occur because of this high inrush current, even though the voltage and steady-state currents are within the switch specifications. Inrush currents can be controlled with series impedance, such as a resistor or ferrite, between the switch and the capacitance. Any capacitance in the system can contribute to inrush currents, whether it is in a reactive device under test or from a shielded cable.

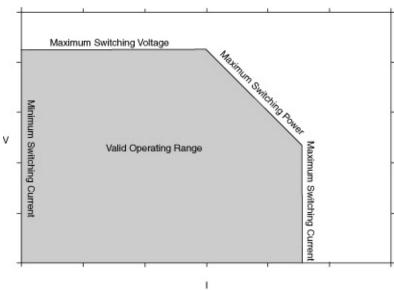


Switching Capacity

Signal levels through a switch must account for the following specifications:

- <u>Switching Voltage</u>
- <u>Switching Current</u>
- <u>Switching Power</u>

The following figure shows the valid operating range defined by these limits.



Switching Voltage

Switching voltage refers to the maximum signal voltage that the switch module can safely maintain. Switching voltage is defined from channelto-ground and from channel-to-channel. Channel-to-ground is the voltage potential between the signal line and the grounded chassis. Channel-tochannel is the voltage potential between any pair of signal lines within the switch module. This voltage includes voltages across open relay contacts, as well as voltages between adjacent connection terminals.

Note CE compliance marking for measurement and control devices requires compliance to the IEC 61010-1 standard. Switch modules intended for high voltage signals (> 60 VDC / 30 V_{rms}) are rated for Installation Categories as defined in this standard. Installation Categories describe the acceptable transient overvoltages and fault protection necessary for safe operation. Refer to the *Read Me First: Safety and Radio-Frequency Interference* document for more information on Installation Categories.

Switching Current

Switching current is the maximum rated current that can flow through the switch as it makes or breaks a contact. Switching active currents results in <u>arcing</u> that can <u>damage the contacts</u> of <u>electromechanical relays</u>. A minimum current specification indicates the smallest current that can reliably flow through the switch.

Switching Power

Switching power is the limit on the combined open-contact voltage and closed-contact current of a signal in the switch.

Switching Power = Switching Voltage * Switching Current

Switching high-power signals causes high-energy <u>arcing</u> at the electromechanical contacts during actuation, reducing the <u>useful life</u> of the switch.

Reed Relay Protection

The <u>life expectancy</u> of a <u>reed relay</u> can be greatly affected by the nature of the load. To prolong the life of reed relays, consider the following list when using switches with reed relays:

- Bounce
- Arcing
- <u>Capacitance</u>
- Inrush Current
- Inrush Current Protection
- Board Layout and Topology
- Example System

In general, reed relays are vulnerable to contact welding from high currents. Parasitic capacitance within a system can unavoidably create high inrush currents that can damage the reed relay. To minimize inrush current, decrease or isolate external capacitance by:

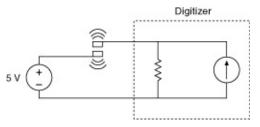
- 1. Using lower switching voltages.
- 2. Avoiding large capacitive loads to the switch.
- 3. Isolating external capacitance with series impedance R_p such that:

 V/R_p < switching current rating of the relay

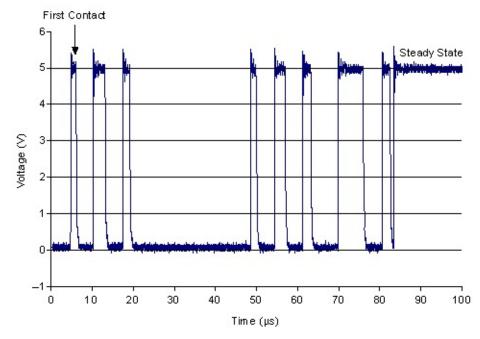
Bounce

<u>Armature</u> and <u>reed relay</u> contacts bounce. When closing, the contacts touch momentarily, making and breaking continuity until finally remaining in the closed position. The following figures demonstrate relay bounce.

Test System to Measure Relay Bounce



Voltage During Relay Bounce

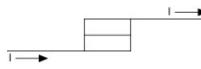


Arcing

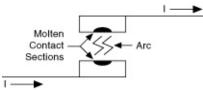
Every switching system has some amount of inductance. When a relay opens a circuit with inductance, an arc occurs across the relay contacts, sometimes causing significant damage. The small mass of the <u>reed relay</u> switch makes the reed more susceptible to damage during arcing.

When bouncing, the first momentary closure initiates current flow through the relay. As the contacts open, an arc forms that can melt part of the contact surface. If the contacts are still molten when they finally stabilize in the closed position and solidify before reopening, a micro-weld can form, permanently closing the relay. The spring force of the reeds may not be sufficient to break this weld when the current stops flowing through the coil. Such contact welding constitutes <u>end-of-life</u> for the relay. The following sequence of figures illustrates a relay bouncing, arcing, and welding closed.

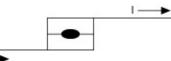
Relay Closed. Current Flows.



Relay Bounces. Arc Melts Contacts.



Relay Closes. Contacts Still Molten.

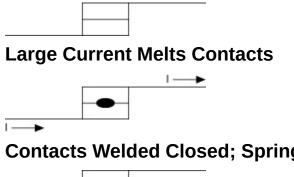


Contacts Welded Closed; Spring Force Unable to Break Weld.



Welding contacts is also possible if you send a large current through relays that are already closed. The non-zero contact resistance can heat up and cause the same welding phenomenon described above. The following sequence of figures show large current welding a relay closed.

Relay Closed



Contacts Welded Closed; Spring Force Unable to Break Weld.

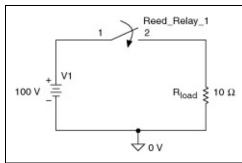
Capacitance

Electrical lifetime specifications for <u>reed relays</u> often assume a resistive load. Other factors such as <u>board traces</u> and external cables can contribute additional capacitance. When a relay closes, this capacitance acts as a transient short circuit until it is recharged. These short circuits generate high inrush currents that are usually much larger than the steady state current and can damage the relay.

Determining the maximum allowable capacitance is dependent on the application where reed relays are used. Relay vendors cannot be more specific about the maximum allowable capacitance because many factors external to the relay affect inrush current.

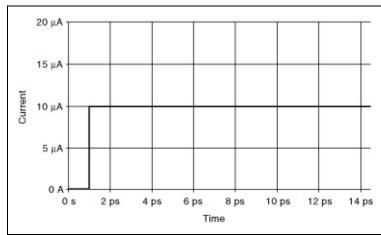
The following figure shows a purely resistive system. When the relay closes, current flows that is proportional to the source voltage V1 and the load resistance R_{load} .

Ideal Resistive System



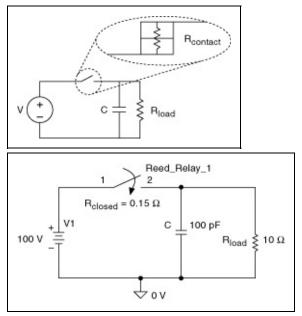
The following figure shows current flowing through the relay.

Resistive Load Switching



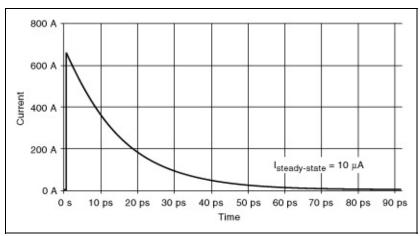
A more realistic system is shown in the following figure. The relay contact has a non-zero resistance, $R_{contact}$ and an output load capacitance, C. When the relay closes an inrush current, limited only by $R_{contact}$, flows through the contacts to charge the capacitor. If the inrush current is much larger than the intended steady state current, the current decreases to the steady state. The time for the inrush current to decrease to the steady state is dependent on the time constant defined by $R_{contact}$ and C.

More Realistic System



The peak inrush current shown in the following figure is much higher than the peak inrush of the ideal resistive system example.

Capacitive Load Switching (T = R_{contact}C)



Inrush Current

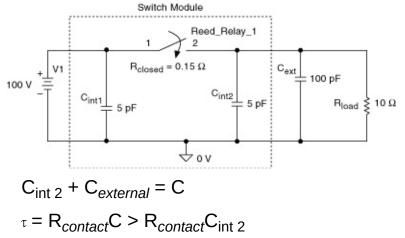
As current flows through the relay, power is dissipated in the contacts as represented in the following equation:

 $P=I^2R_{contact}+I^2R_{arc}$

R_{arc} is the resistance of the arc that exists between the relay contacts during bounce. This power dissipates as heat, raising the temperature of the contacts. Inrush currents momentarily expose the contacts to very high power levels. The energy associated with the inrush current may be sufficient to melt the contact surfaces after bouncing and weld the relay contacts closed. Inrush currents usually decrease rapidly to the steady state levels. Contact bounce, however, can subject the relay to multiple inrushes per activation, causing further damage.

The following figure shows a relay within a switch module connected to a voltage source and a load. C_{int1} , C_{int2} and $R_{contact}$ always produce an inrush current proportional to the input voltage. The duration of the inrush current increases (as does contact heating) with the addition of external capacitance at the load. Inrush current flows while load capacitance C_{int2} and C_{ext} are being charged.

Circuit with Source and Load



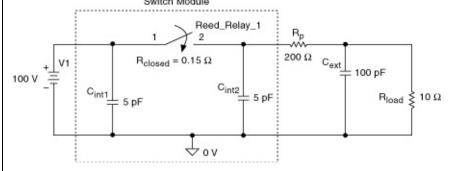
Inrush Current Protection

To limit inrush current, an impedance, such as a resistor, can be placed *in series* between C_{int2} and $C_{external}$. This resistor isolates the unwanted effects of the load capacitance and limits damage to the relay contacts. A protection resistance, R_p , should be selected such that

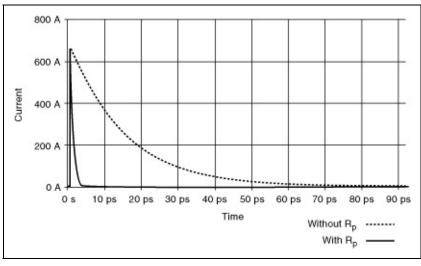
 V/R_p < switching current rating of the relay

The following figures illustrate the use of the protection resistor $R_{p.}$

Resistor R_p Added to Limit Current into C_{external}



Current Graph Comparison

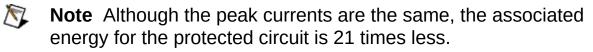


The energy associated with the inrush currents in these two circuits can be expressed as

 $E_{without protection} = \frac{1}{2}(C_{int2}+C_{ext})V^2 = 525 nJ$

and

 $E_{with protection} = \frac{1}{2}(C_{int2})V^2 = 25 nJ$

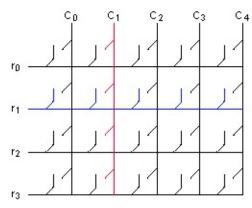


Board Layout and Topology

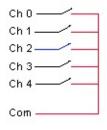
The open contact capacitance of a single <u>reed relay</u> is often very low (< 1 pF), and cannot store enough energy to damage the relay when switching at the rated voltage. The amount of capacitance across an open relay is directly related to the topology of the switch, the layout of the PCBs, and the loads connected to the switch module.

Topologies with long traces and many connected relays, such as matrices, have higher capacitances than simpler topologies.

Matrix Topology



Multiplexer Topology

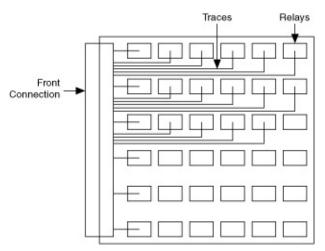


Equivalent Circuit



Most instrumentation switches have arrays of relays on a circuit board and a connector on one side. All of the traces must route to the connector. Dense, parallel routes on a PCB increase capacitance between the traces.

Dense Signal Routing Increases Parasitic Capacitance

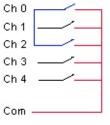


Connecting large capacitive loads directly to the switch terminals or connecting multiple terminals together can substantially increase the load capacitance.

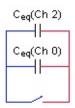
Capacitive Load Connected to a Multiplexer Channel

	Ch 0	
c∟⊥	Ch 1	
	Ch 2	
_	Ch 3	
	Ch 4	
Com -		ļ

Multiplexer with 2 Inputs Tied Together



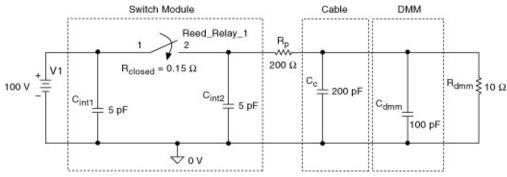
Equivalent Circuit of 2 Multiplexer Channels Tied Together



Example System

The following figure illustrates a test system with a capacitance of 200 pF added to simulate cable capacitance. Also, the external load has been identified as the input to a high-impedance DMM. Even the input to the DMM presents a substantial capacitive load. The addition of the cable to connect the switch to the load increases this load further. The total load capacitance is 300 pF.

Test System with Protection



The following table shows lifetime test results for a circuit with no protection and for a circuit with 200Ω of protection resistance.

R _p (Ω)	Lifetime (cycles)
0	160,000
200	1,500,000

This example shows nearly a 10-to-1 increase in lifetime when a protective series impedance is used to isolate the switch from the capacitive load.

RF Switching Considerations

This book contains information about the terminology and concepts related to RF switching applications.

- Characteristic Impedance
- Rise Time
- Bandwidth and Insertion Loss
- <u>VSWR</u>
- <u>Crosstalk</u>
- Isolation

Characteristic Impedance

Characteristic impedance is a transmission line parameter that determines how propagating signals are transmitted or reflected in the line. The following equation and figures represent the components of characteristic impedance.

$$Z_0 = \int_{\frac{\sqrt{R + j\omega L}}{G + j\omega C}}^{\sqrt{R + j\omega L}}$$

where

 Z_0 is the characteristic impedance

L is the inductance per length

C is the capacitance per length

R is the resistance per length

G is the dielectric conductance per length

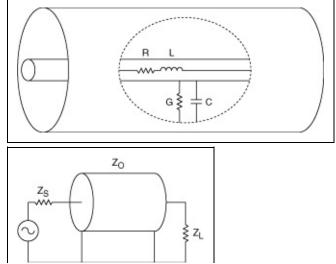
 $_{\omega}$ is the frequency (radians/s)

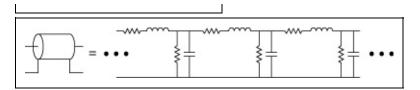
If a transmission line is in the system, its characteristic impedance must also match the source and the load for maximum power transfer.

In an ideal, lossless transmission line, there is no series resistance or dielectric loss, as shown by the following formula:

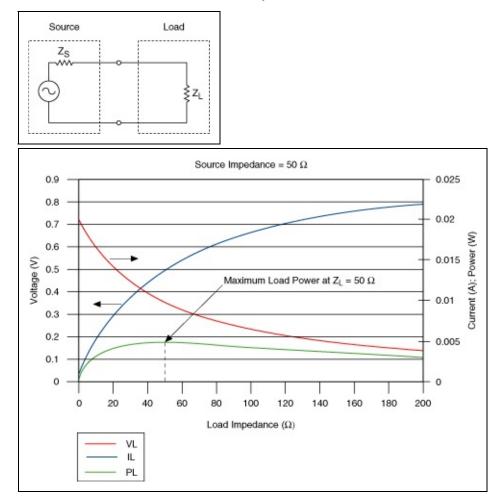
$$R = 0$$

=> $Z_0 = \sqrt{\frac{L}{c}}$ (frequency independent)
G = 0





Maximum power is transferred in a system from the source to the load when both have the same impedance, as shown in the following figure:

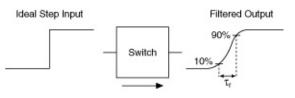


Rise Time

Given an ideal step input, *rise time* is the time required for the output signal voltage to rise from 10% to 90% of the step amplitude. Rise time is related to <u>bandwidth</u> using the following approximation:

 $\tau_r = 0.35$ /bandwidth (Hz)

The following figure illustrates rise time.



Bandwidth and Insertion Loss

Signal bandwidth is the useful range of signal frequencies for a switch. NI switch modules are specified for frequencies as low as DC, so bandwidth is specified as the maximum recommended signal frequency. In many cases, bandwidth is the highest signal frequency that the switch can maintain <3 dB of insertion loss. Some RF modules specify bandwidths based on reflections (VSWR) instead of insertion loss.

Insertion Loss

As a high-frequency signal traverses through a switch module, it is attenuated by series resistance, dielectric absorption, and by reflections from impedance mismatches. This attenuation is called insertion loss. The amount of signal remaining at the output of the switch module is represented as a ratio to the input signal in decibels (dB):

Transmitted signal (dB) = $10 \log(P_{out}/P_{in})$

where P_{out} is the output power level, and P_{in} is the input power level.

This ratio can also be expressed in terms of signal voltage:

Transmitted signal (dB) = $20 \log(V_{out}/V_{in})$

Because the switch attenuates the signal, output magnitude is less than input magnitude, and the transmitted signal ratio is always <0 dB.

By convention, *insertion loss* is the ratio of input signal to the output signal, in decibels (dB):

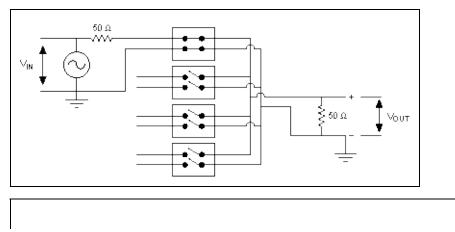
Insertion loss (dB) = $10 \log(P_{in}/P_{out}) = -10 \log(P_{out}/P_{in})$

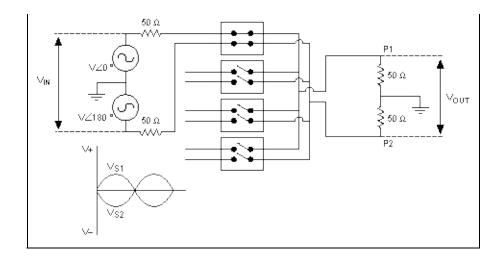
Insertion loss (dB) = $20 \log(V_{in}/V_{out}) = -20 \log(V_{out}/V_{in})$

Output magnitude is less than input magnitude, so insertion loss is >0 dB.

The contributing factors of series resistance, dielectric loss, and mismatch reflections are frequency dependent and generally result in insertion loss rising with signal frequency.

The following figures illustrate single-ended and differential measurements, respectively.





Bandwidth and Square Waves

If a signal is purely sinusoidal, the bandwidth/insertion loss rating of a switch module can be directly applied. For signals that have multiple frequency components, like a square wave, the rating may be difficult to apply.

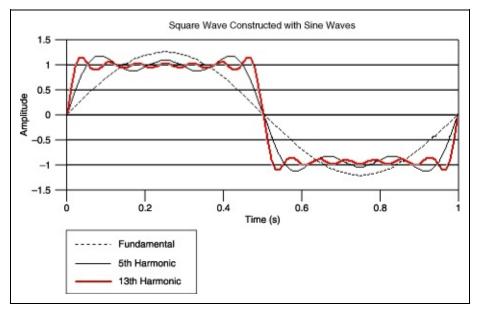
A square wave can be represented using a natural harmonic series, where only the odd harmonics are used. The frequency components that make up an ideal square wave are infinite.

```
Square wave (t) = (4/\pi)[\sin \omega t + (1/3)\sin 3\omega t + (1/5)\sin 5\omega t + ...]
```

where \mathbf{w} is frequency in radians per second

A square wave may have a fundamental frequency below the rated bandwidth. However, harmonics above the rating may be attenuated by increasing <u>insertion loss</u>.

For example, consider a 2 V peak-to-peak square wave. The square wave can be approximated by the summation of multiple harmonic sine waves. Three harmonics are shown in the following figure: the fundamental frequency (or first harmonic), the fifth, and the 13th harmonic.



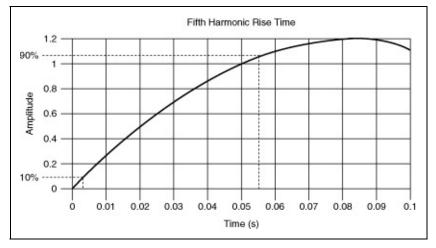
If the frequency content of a square wave is *known*, the required switch bandwidth can be determined based on the highest harmonic to be passed with minimal distortion.

If the frequency content is *unknown*, the -3 dB point can be approximated using the rise time of the harmonic to be preserved. The rise time is related to the -3 dB point bandwidth by the following approximation:

3 dB bandwidth (Hz) $\approx 0.35/\tau_r$

where τ is the <u>rise time</u> from 10% to 90% of the signal amplitude.

The following figure shows this approximation applied to the fifth harmonic of the square wave from the previous example:



where $\tau = 0.0515 \text{ s}$

```
3 dB bandwidth = 6.79 Hz
```

To preserve the <u>rise time</u> of the signal, a switch with an <u>insertion loss</u> of 3 dB at 6.79 Hz minimum should be chosen.

For a square wave, once the fifth or seventh harmonic is reached, the change in the rise time is minimal. In the previous example, a switch with an insertion loss of 3 dB at 7 Hz will be sufficient to pass as a 1 Hz square wave.

P

Tip For square wave signals, select a switch with a –3 dB point at a frequency seven times the fundamental frequency of the square wave. If less attenuation is desired, the –3 dB point should be a higher frequency.

Voltage Standing Wave Ratio (VSWR)

Any impedance mismatches along a transmission line causes partial reflection of the propagating signals. The impedance difference determines the magnitude of the reflection. The length of a mismatched section determines the lowest signal frequencies that reflect from the section. VSWR is a measure of that signal reflection.

With an incident sine wave into the switch module, some of the signal reflects down the line. This reflected wave interferes with the incident wave. VSWR is the ratio of maximum to minimum amplitude in the resulting interference wave, as shown in the following formula:

 $VSWR = \frac{1 + [p]}{1 - [p]}$

where p is the reflection coefficient

Reflections can also be represented as a logarithmic ratio of the reflected signal to the input signal. This ratio is called return loss:

 $\begin{aligned} \mathsf{RL} (\mathsf{dB}) &= 10 \log \left(\mathsf{P}_\mathsf{IN} / \mathsf{P}_\mathsf{REFLECTED}\right) \\ &= 20 \log \left(\mathsf{V}_\mathsf{IN} / \mathsf{V}_\mathsf{REFLECTED}\right) \\ &= -20 \log \left(\mathsf{V}_\mathsf{REFLECTED} / \mathsf{V}_\mathsf{IN}\right) \\ &= -20 \log |\mathsf{p}| \end{aligned}$

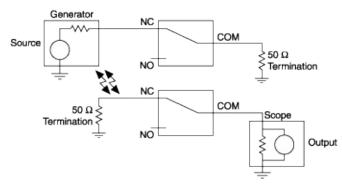
Crosstalk

Crosstalk is the amount of signal from one active channel that appears on another active channel. Crosstalk is specified in dB of transmission, according to one of the following equations:

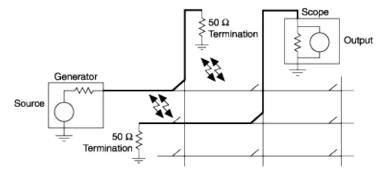
Crosstalk (dB) = 10 log (P_{out} / P_{source}) Crosstalk (dB) = 20 log (V_{out} / V_{source})

The following figures illustrate crosstalk. All channels are assumed to be appropriately terminated.

Crosstalk on a General Purpose Module



Crosstalk on a Matrix Module



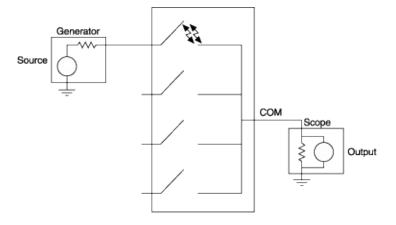
Isolation

Isolation is the ability to keep a signal on an unused channel from appearing on an active, terminated channel. Isolation is specified in dB of rejection, according to one of the following equations:

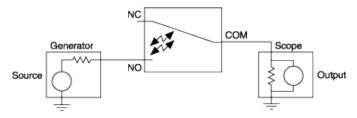
 $\begin{aligned} \text{Isolation (dB)} &= 10 \text{ log } (P_{\text{source}} \,/ \, P_{\text{out}}) \\ \text{Isolation (dB)} &= 20 \text{ log } (V_{\text{source}} \,/ \, V_{\text{out}}) \end{aligned}$

The following figures illustrate isolation.

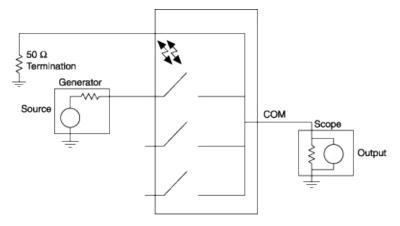
Open Relay Isolation on a Multiplexer Module







Channel to Channel Isolation



Scanning

Scanning is typically used when the timing of connections must be synchronized with an event from another device, such as a measurement device (hardware-timed scanning), or must be timed by software (software-timed scanning).

Connection operations are entered in a <u>scan list</u> that is downloaded to the memory of the switch module. The first entry in the scan list is executed when the scan is initiated. The trigger settings determine how the switch advances through subsequent entries in the list. The scan list can be executed once or repeatedly.

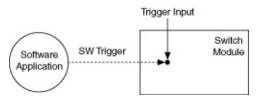
There are three trigger schemes for scanning:

- <u>Software trigger scanning</u>—for software-timed scanning
- <u>Synchronous scanning</u>—for hardware-timed scanning
- Handshaking—for hardware-timed scanning

Refer to <u>Controlling and Triggering Switches</u> for information about controlling and triggering your switch module.

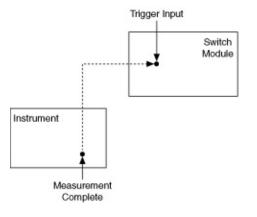
Software Trigger Scanning

In software trigger scanning, the <u>niSwitch Send Software Trigger</u> VI and the <u>niSwitch_SendSoftwareTrigger</u> function advance the scan list. Call the niSwitch Send Software Trigger VI or the niSwitch_SendSoftwareTrigger function again to execute the next scan list entry.



Synchronous Scanning

With synchronous scanning, the DMM takes a measurement and generates a digital pulse—measurement complete (MC). When the switch receives this digital pulse, it advances to the next entry in its scan list. The DMM takes the next measurement after a time interval. You must program the DMM interval time by configuring an Interval Sample Trigger. Set the **interval** parameter to the time needed for the switch to activate and settle. Initiate the switch before initiating the DMM for its first measurement.

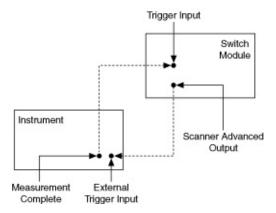


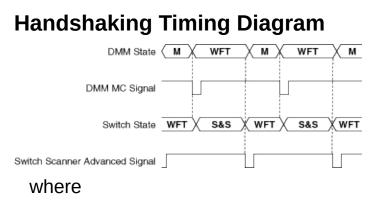
Synchronous Scanning Timing Diagram

DMM State M Interval M Interval DMM MC Signal Switch State WFT S&S WFT S&S Where M = measurement WFT = wait for trigger S&S = switch and settle

Handshaking

With handshaking, the DMM is initiated and waiting for a trigger. The switch module is initiated, executes the first connection in the scan list, and generates a digital pulse—Scan Advanced Output. The DMM receives a signal from the switch, takes a measurement, and then generates a digital pulse—measurement complete (MC). When the switch receives the digital pulse, it advances to the next entry in its scan list. After the relays of the switch module have settled, the switch sends a digital pulse and triggers the DMM for a new measurement. Refer to the Multiple Point Acquisitions topic in the *NI Digital Multimeters Help* at ni.com/manuals to determine the triggering options.





M = measurement

WFT = wait for trigger

S&S =switch and settle

Installing and Configuring Devices

Expand this book for information about installing and configuring NI switches.

PXI Devices

Expand this book for information about installing and configuring an NI PXI switch.

Installing a PXI Switch

Refer to the *NI Switches Getting Started Guide* for information about installing a PXI switch.

Configuring a PXI Switch

Configure all PXI switch modules under **NI-DAQmx Devices** in MAX. Refer to the *NI Switches Getting Started Guide* for detailed information about configuring a PXI switch.

SCXI Devices

Expand this book for information about installing, configuring, and controlling an NI SCXI switch.

Installing an SCXI Switch

Refer to the *NI Switches Getting Started Guide* for information about installing an SCXI switch.

Configuring an SCXI Switch

Configure SCXI switch modules in MAX under the API you are using to control the module—NI-DAQmx and/or Traditional NI-DAQ (Legacy).

Your SCXI switch and your switch controller determine your MAX configuration options. For example, the NI 4021 can control a switch module configured under NI-DAQmx Devices or Traditional NI-DAQ (Legacy) Devices. The NI 4060 can control only SCXI switch modules configured under Traditional NI-DAQ (Legacy) Devices. Refer to the following table to determine your MAX configuration options.

NI Controller	NI SCXI- 1127/1128/1129/1160/1161/1163R/1190/1191/1192 Switches	All Oth NI SC Switch
NI 4021 NI 407 <i>x</i> E Series M Series	NI-DAQmx/Traditional NI-DAQ (Legacy)	NI- DAQn
NI 4060	Traditional NI-DAQ (Legacy)	
NI 4065	NI-DAQmx	
USB	NI-DAQmx	

NI-DAQmx

Refer to the *NI Switches Getting Started Guide* for information about configuring an SCXI switch using NI-DAQmx.

Traditional NI-DAQ (Legacy)

If you are using Traditional NI-DAQ (Legacy), complete the following steps to configure the SCXI chassis and switch module.

- 1. Power on the chassis.
- 2. Right-click **Traditional NI-DAQ (Legacy) Devices** in the configuration tree, and select **Add SCXI Chassis**. The Add SCXI Device dialog box opens.
- 3. Select **SCXI Chassis**, and click **Next**. The Select SCXI Chassis dialog box opens.
- 4. Select the type of chassis you want to add, and click **Next**. The Chassis Configuration dialog box opens.
- 5. Select an ID to identify the chassis in your application. The ID can be any integer between 1 and 3,200.
- 6. Enter the chassis address setting. Ensure that the setting you enter matches the address setting on the SCXI chassis, and click **Next**. The SCXI Auto-Detect dialog box opens.
- 7. Enable the auto-detect to auto-detect installed SCXI switch modules, and click **Next**. The Select SCXI Communication Path dialog box opens.
- 8. Select the controller that acts as the communication path between the chassis and the computer, and click **Next**. The SCXI Auto-Detection Results dialog box opens.
- 9. Select the switch module that is cabled to the switch controller, and click **Finish** to accept the settings. If the chassis has only one communication device, this device is selected as the communication device by default.
- 10. Select the chassis from **Devices and Interfaces»Traditional NI-DAQ (Legacy) Devices**.
- 11. Right-click a module slot, and select **Properties**.
- 12. The SCXI Configuration dialog box opens. The **General** tab is selected by default. Select the controller connected to the module from the Connected to listbox. Select the checkbox if the DAQ device controls the chassis.
- 13. Select the **Accessory** tab (if available). Select the terminal block connected to the switch module from the Accessory listbox.

14. Click **OK** to accept the settings.

Controlling and Triggering an SCXI Switch

SCXI switch modules require a dedicated switch controller, often cabled to the switch using an <u>backplane adapter</u>.



Note PXI switches are controlled by the PXI chassis controller and do not require a dedicated switch controller.

In SCXI switch scanning, the switch controller is the liaison between the application development environment (ADE) and the switch module. Using the SCXI protocol, the switch controller communicates with the switch to set the parameters selected in the program and download the <u>scan list</u> to the switch memory. A triggering device advances the scan list through its entries.

The switch controller and the triggering device can be, but are not necessarily, the same device. While you can use an NI DMM as a switch controller and/or a triggering device, the NI 4021 does not have triggering capabilities and can only be used as a switch controller. When controlling an SCXI switch with an NI 4021, use a measurement device, such as an NI DMM, to trigger the switch. The controller, the cabling scheme, and the SCXI switches dictate the scanning capabilities.

The following cables control or trigger SCXI switches and can connect to an <u>SCXI backplane adapter</u>:

- <u>SH9MD-AUX cable</u>
- USB cable
- AUX trigger cable

SH9MD-AUX Cable

The SH9MD-AUX cable, as shown in the following figure, carries SCXI communication from a switch controller (NI 4021, DMM, E Series, or M Series device) to an SCXI switch module.

The following table lists the functionality of an SH9MD-AUX cable when used with specific SCXI switch controllers.

Controller	Functionality	Scanning Supported
NI 4060	SCXI communication and measurement complete (MC) signal	synchronous scanning
NI 407 <i>x</i> /4065	SCXI communication, MC signal, and scanner advanced (SA) signal	<u>synchronous</u> <u>scanning</u> and handshaking
NI 4021	SCXI communication	N/A

USB Cable

The USB cable, as shown in the following figure, controls an SCXI switch module when used with an NI USB-1359/1358/1357 kit. Refer to the *NI Switches Getting Started Guide* and the <u>NI 1357/1358/1359 SCXI</u> <u>Controller/Adapter Kit Installation Guide</u> for more information about USB switch control.

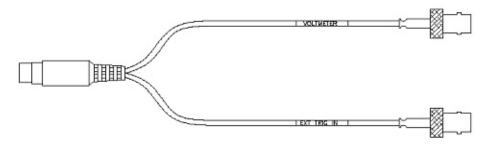
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E l ↔ l°		0	<u>~</u>	0
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AUX Trigger Cable

The AUX trigger cable, as shown in the following figure, separates two triggers (MC and EXT TRIG IN) from an NI DMM. These triggers connect to a switch module terminal block or front panel. The branch of the AUX trigger cable labeled VOLTMETER COMPLETE carries the MC signal from the DMM. The other branch, labeled EXT TRIG IN, carries the SA signal from the switch to the DMM. Use the AUX trigger cable between a PCI or PXI DMM and a PXI or SCXI switch.



Note Using an AUX trigger cable, a DMM can send and receive triggers but cannot control SCXI switches.



SCXI Backplane Adapters

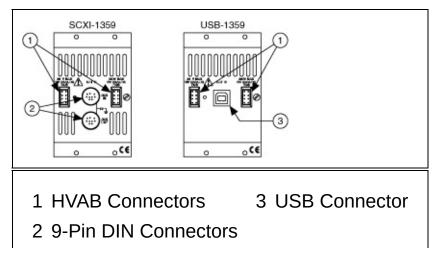
To cable a switch controller to a switch module using an <u>SH9MD-AUX</u> <u>cable</u>, SCXI switches require an SCXI backplane adapter. For example, DMMs and NI 4021 switch controllers require an NI SCXI-1359/1358/1357 adapter kit to connect to an SCXI switch module. For information about SCXI switch controller/switch module compatibility and to identify the adapter kit(s) required for cabling, refer to the *NI Switches Getting Started Guide*.

An SCXI backplane adapter routes signals from the SH9MD-AUX cable to the back of the switch in the rightmost position of the chassis. If you are using an NI SCXI-1127/1128/1129/1175, use a backplane adapter to share high-voltage signals among all SCXI switch modules. Unlike digital signals from the SH9MD-AUX or USB cable that are routed to only one SCXI switch, the high-voltage signals are shared among all switches connected to the backplane. Additionally, you can use an HV8-BAN4 cable to connect an SCXI backplane to a DMM and route high-voltage signals to a DMM.

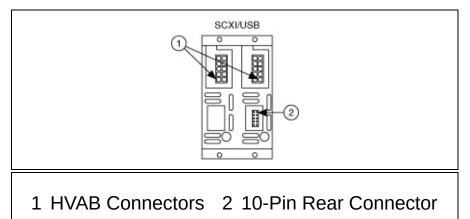
Note In <u>multiple module scanning</u>, only one SCXI switch must be connected to the switch controller or triggering device.

NI offers SCXI and USB versions of the 1357, 1358, and 1359 backplane adapter kits that can connect from two to eight SCXI switches. Visit ni.com for information about the NI 1357/1358/1359 SCXI Controller/Adapter Kit.

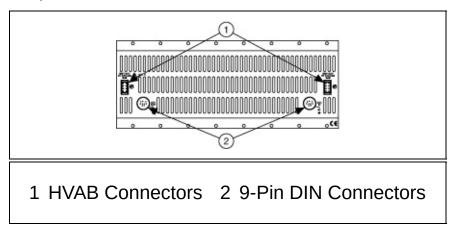
The following figure represents the front view of a 2-slot backplane adapter/controller.



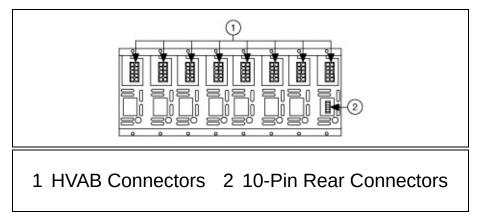
The following figure represents the rear view of a 2-slot backplane adapter/controller.



The following figure represents the front view of an 8-slot backplane adapter.



The following figure represents the rear view of an 8-slot backplane adapter.



Devices

Expand this book for NI switch module device-specific information.

NI PXI-2501/2503

The NI PXI-2501/2503 are <u>multiplexer/matrix</u> switch modules for the PXI platform. The NI PXI-2501 is composed of <u>solid-state relays</u>, and the NI PXI-2503 uses <u>armature relays</u>.



Note For EMC compliance, operate this device with shielded cables.

NI PXI-2501 Operation Modes

The following table lists the supported topology of the NI PXI-2501 and possible <u>operation modes</u>.

Topology	Software Name
<u>1-Wire</u> <u>48×1</u> Multiplexer	2501/1-Wire 48x1 Mux (NISWITCH_TOPOLOGY_2501_1_WIRE_48X1_MUX)
<u>1-Wire</u> <u>48×1</u> <u>Amplified</u> <u>Multiplexer</u>	2501/1-Wire 48x1 Amplified Mux (NISWITCH_TOPOLOGY_2501_1_WIRE_48X1_AMPLIFIED
<u>2-Wire</u> <u>24×1</u> Multiplexer	2501/2-Wire 24x1 Mux (NISWITCH_TOPOLOGY_2501_2_WIRE_24X1_MUX)
2-Wire 24×1 Amplified Multiplexer	2501/2-Wire 24x1 Amplified Mux (NISWITCH_TOPOLOGY_2501_2_WIRE_24X1_AMPLIFIED
<u>2-Wire</u> Dual 12×1 Multiplexer	2501/2-Wire Dual 12x1 Mux (NISWITCH_TOPOLOGY_2501_2_WIRE_DUAL_12X1_MU>
<u>2-Wire</u> Quad 6×1 Multiplexer	2501/2-Wire Quad 6x1 Mux (NISWITCH_TOPOLOGY_2501_2_WIRE_QUAD_6X1_MUX)
<u>2-Wire</u> <u>4×6 Matrix</u>	2501/2-Wire 4x6 Matrix (NISWITCH_TOPOLOGY_2501_2_WIRE_4X6_MATRIX)
<u>4-Wire</u> <u>12×1</u> Multiplexer	2501/4-Wire 12x1 Mux (NISWITCH_TOPOLOGY_2501_4_WIRE_12X1_MUX)

NI PXI-2503 Operation Modes

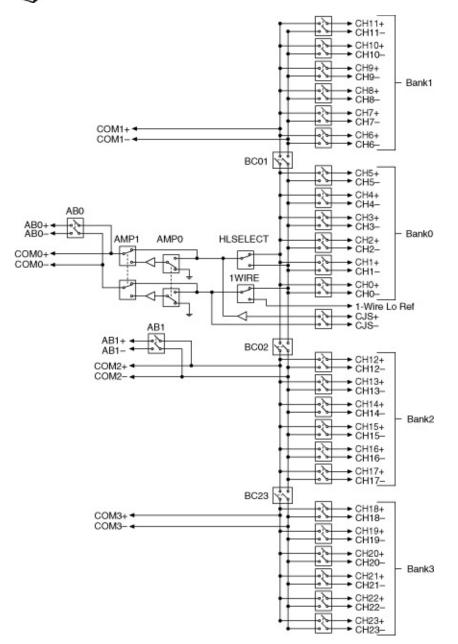
The following table lists the supported topologies of the NI PXI-2503 and possible <u>operation modes</u>.

Topology	Software Name
<u>1-Wire</u> <u>48×1</u> Multiplexer	2503/1-Wire 48x1 Mux (NISWITCH_TOPOLOGY_2503_1_WIRE_48X1_MUX)
<u>2-Wire</u> <u>24×1</u> Multiplexer	2503/2-Wire 24x1 Mux (NISWITCH_TOPOLOGY_2503_2_WIRE_24X1_MUX)
<u>2-Wire</u> Dual 12×1 Multiplexer	2503/2-Wire Dual 12x1 Mux (NISWITCH_TOPOLOGY_2503_2_WIRE_DUAL_12X1_MU>
<u>2-Wire</u> <u>Quad 6×1</u> <u>Multiplexer</u>	2503/2-Wire Quad 6x1 Mux (NISWITCH_TOPOLOGY_2503_2_WIRE_QUAD_6X1_MUX)
<u>2-Wire</u> <u>4×6 Matrix</u>	2503/2-Wire 4x6 Matrix (NISWITCH_TOPOLOGY_2503_2_WIRE_4X6_MATRIX)
<u>4-Wire</u> <u>12×1</u> Multiplexer	2503/4-Wire 12x1 Mux (NISWITCH_TOPOLOGY_2503_4_WIRE_12X1_MUX)

NI PXI-2501 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2501.

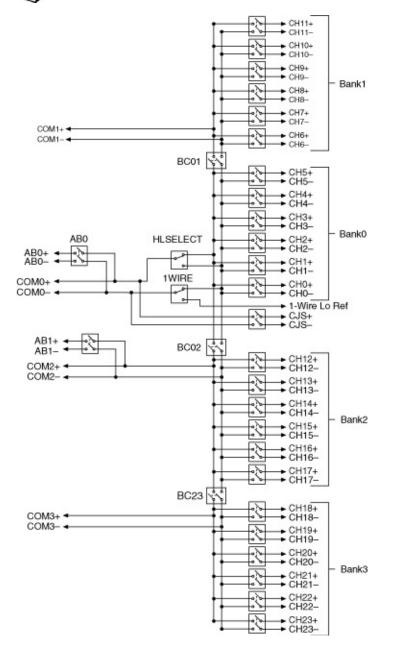
Note Relay names are the same for every topology.



NI PXI-2503 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2503.

Note Relay names are the same for every topology.



NI PXI-2501 Amplifier

The NI PXI-2501 has an amplifier with a gain of 1. This amplifier can be switched in-line before the COMO signal and the ABO signal. The amplifier helps decrease the settling time of the FET switch. The high-impedance amplifier isolates the FET from the resistance, capacitance, and inductance in the external wiring. This isolation decreases the resistance/capacitance time constant seen by the FET, which improves settling time.

The amplifier has an offset that should be calibrated for more accurate measurements. The calibration data can be stored into and retrieved from the EEPROM on the module. You can use NI-SWITCH to retrieve and store the calibration data. When the amplifier is used, the switch module becomes directional, where CH*x* is for signal inputs and COM0 or AB0 are for signal outputs.

The NI PXI-2501 also has an amplifier in the CJSO+ to COMO+ signal path. This amplifier in the cold-junction sensor signal path is used to improve settling time performance. It prevents the impedance of the coldjunction sensor from increasing the settling time when switching the CJS channel. As a result, when scanning thermocouples, the settling time for the cold-junction sensor channel should be about the same as for the channels with the thermocouples.

Cold-Junction Temperature Sensor Channel

The NI PXI-2501/2503 has a dedicated temperature sensor channel useful for cold-junction compensation when switching thermocouples. The <u>NI TB-2605</u> and TBX-68S terminal blocks both have onboard temperature sensors that connect to the dedicated cold-junction sensor channel. You can access the cold-junction sensor channel by connecting to channel cjtemp in the 2-wire 24×1 multiplexer, 2-wire dual 12×1 multiplexer, and 2-wire quad 6×1 multiplexer topologies.

NI PXI-2501/2503 Current-Loop Receivers

The NI PXI-2501/2503 modules have sockets for transforming individual channels to current-to-voltage converters. NI offers a process-current pack of four 249 Ω , 0.1%, 5 ppm, 0.25 W resistors. The reference designator format for the current-loop resistors is such that for input channel *x*, the resistor is RCL*x*. For example, the resistor for channel 14 is RCL14.

Caution Before installing the resistors in your module, make sure that no signals are connected to your module front connector.

Before installing your module in the NI PXI chassis, you must install the resistors by performing the following steps:

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis. Properly grounding yourself prevents damage to your PXI module from electrostatic discharge.
- 2. Bend and trim the resistor lead as shown in the following figure. Be sure that the resistor does not extend more than 0.5 in. above the surface of the circuit board.



3. Insert the resistor into the appropriate socket, labeled RCLx.

Matrix Expansion

To expand the matrix of a PXI-2501/2503, directly connect wire from one terminal block to the other using the NI TB-2606 terminal block. Each PXI-2501/2503 can operate as a 4×6 matrix. To form a 4×12 matrix, use two PXI-2501/2503 modules and connect all the rows from both TB-2606 terminal blocks.

To form a 12×6 matrix, you need three PXI-2501/2503 modules with three TB-2606 terminal blocks. Connect all the columns from all three terminal blocks. Refer to *Application Note 174* at <u>ni.com/zone</u> for additional information.



Note The analog bus connectors cannot be used to expand a matrix.

Multiplexer Expansion

To handle large channel counts, you can expand the size of the multiplexer with additional NI PXI-2501/2503 modules. NI TB-2605 terminal block has two analog bus connectors to allow connection of two other PXI-2501/2503s. Connecting two NI PXI-2501/2503 modules using their analog bus in 2-wire 24×1 multiplexer topology creates a 2-wire 48×1 multiplexer. Using the LV6-BAN4 cable you can also route the common to an NI 4070 DMM for measurement.

NI PXI-2501/2503 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2501/2503.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG IN on TB- 2605 terminal block

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2501/2503.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Front Connector	External (NISWITCH_VAL_EXTERNAL)	SCANADV on TB- 2605 terminal block

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2527

The NI PXI-2527 is a high-density <u>multiplexer</u> switch module for the PXI platform. The NI PXI-2527 uses <u>armature relays</u>.



Note For EMC compliance, operate this device with shielded cables.

Operation Modes

The following table lists the supported topologies of the NI PXI-2527 and possible <u>operation modes</u>.

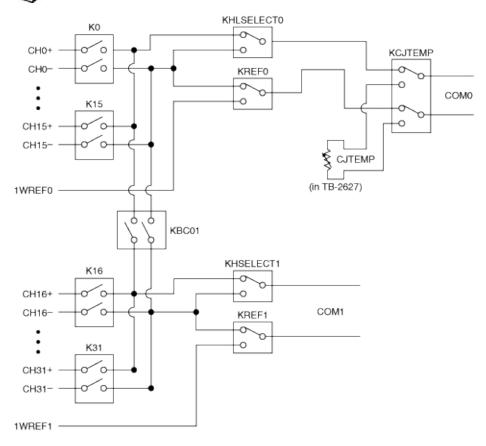
Topology	Software Name
<u>1-Wire 64×1</u> <u>Multiplexer</u>	2527/1-Wire 64x1 Mux (NISWITCH_TOPOLOGY_2527_1_WIRE_64X1_MUX)
<u>1-Wire Dual</u> <u>32×1</u> Multiplexer	2527/1-Wire Dual 32x1 Mux (NISWITCH_TOPOLOGY_2527_1_WIRE_DUAL_32X1_ML
<u>2-Wire 32×1</u> Multiplexer	2527/2-Wire 32x1 Mux (NISWITCH_TOPOLOGY_2527_2_WIRE_32X1_MUX)
<u>2-Wire Dual</u> <u>16×1</u> Multiplexer	2527/2-Wire Dual 16x1 Mux (NISWITCH_TOPOLOGY_2527_2_WIRE_DUAL_16X1_ML
<u>4-Wire 16×1</u> <u>Multiplexer</u>	2527/4-Wire 16x1 Mux (NISWITCH_TOPOLOGY_2527_4_WIRE_16X1_MUX)
Independent	2527/Independent (NISWITCH_TOPOLOGY_2527_INDEPENDENT)

NI PXI-2527 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2527.

 \mathbf{N}

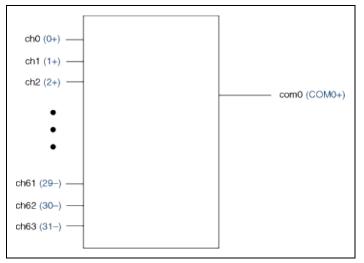
Note Relay names are the same for every topology.



NI PXI-2527 1-Wire 64×1 Multiplexer Topology

Connect to the pins of the <u>NI TB-2627</u> terminal block to use the NI PXI-2527 as a <u>1-wire</u> 64×1 <u>multiplexer</u>. In this topology, all channel terminals (CH0 through CH63) route to both COM0+ and COM1+. The 1WREF0 lead is connected to COM0–, and the 1WREF1 lead is connected to COM1–. The pair COM0+ and COM0– is addressed as com0 in software, and the pair COM1+ and COM1– is addressed as com1 in software. In this topology, COM0+ is connected to COM1+.

The following figure represents the NI PXI-2527 in the 1-wire 64×1 multiplexer topology.



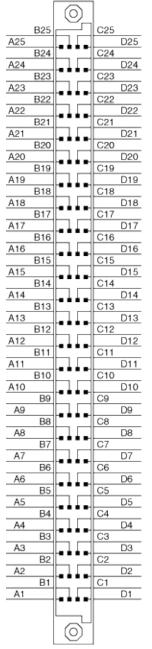
Legend: Software Name (Hardware Name)

Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to CH2+ is routed to COM0+

The following figure and table identify the pins for the NI PXI-2527 in the 1-wire 64×1 multiplexer topology.



Software Name	Pin Number	Software Name	Pin Number
ch0	A1	ch36	B3
ch1	D1	ch37	C3
ch2	A2	ch38	B4

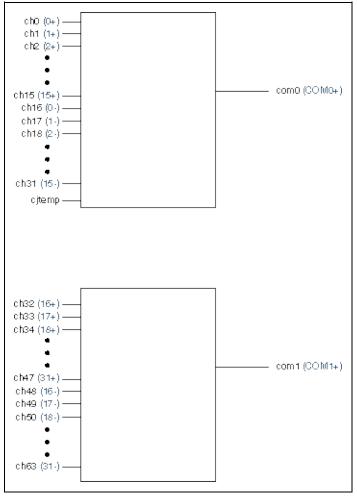
ch3	D2	ch39	C4
ch4	A3	ch40	B5
ch5	D3	ch41	C5
ch6	A4	ch42	B6
ch7	D4	ch43	C6
ch8	A5	ch44	B7
ch9	D5	ch45	C7
ch10	A6	ch46	B8
ch11	D6	ch47	C8
ch12	A7	ch48	B10
ch13	D7	ch49	C10
ch14	A8	ch50	B11
ch15	D8	ch51	C11
ch16	A10	ch52	B12
ch17	D10	ch53	C12
ch18	A11	ch54	B13
ch19	D11	ch55	C13
ch20	A12	ch56	B14
ch21	D12	ch57	C14
ch22	A13	ch58	B15
ch23	D13	ch59	C15
ch24	A14	ch60	B16
ch25	D14	ch61	C16
ch26	A15	ch62	B17
ch27	D15	ch63	C17
ch28	A16	1wref0	C9
ch29	D16	1wref1	C18
ch30	A17	com0+	A9
ch31	D17	com0–	B9
ch32	B1	com1+	A18

ch33	C1	com1–	B18
ch34	B2	cjtemp+	A25
ch35	C2	cjtemp–	D25

NI PXI-2527 1-Wire Dual 32×1 Multiplexer Topology

Connect to the pins of the NI TB-2627 terminal block to use the NI PXI-2527 as a <u>1-wire</u> dual 32×1 <u>multiplexer</u>. In this topology, CH0 through CH31 route to COM0+, and CH32 through CH63 route to COM1+. The 1WREF0 lead is connected to COM0– and the 1WREF1 lead is connected to COM1–. The pair COM0+ and COM0– is addressed as com0 in software, and the pair COM1+ and COM1– is addressed as com1 in software.

The following figure represents the NI PXI-2527 in the 1-wire dual 32×1 multiplexer topology.



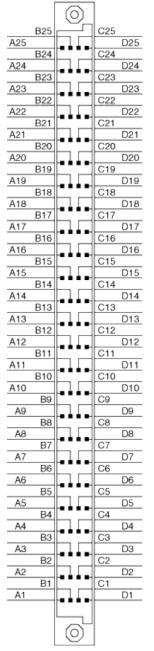
Legend: Software Name (Hardware Name)

Making a Connection

Both the scanning command, $ch2 \rightarrow com0$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

signal connected to CH2+ is routed to COM0+

The following figure and table identify the pins for the NI PXI-2527 in the 1-wire dual 32×1 multiplexer topology.



Software Name	Pin Number	Software Name	Pin Number
ch0	A1	ch36	A12
ch1	D1	ch37	D12
ch2	A2	ch38	A13

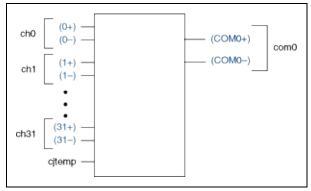
ch3	D2	ch39	D13
ch4	A3	ch40	A14
ch5	D3	ch41	D14
ch6	A4	ch42	A15
ch7	D4	ch43	D15
ch8	A5	ch44	A16
ch9	D5	ch45	D16
ch10	A6	ch46	A17
ch11	D6	ch47	D17
ch12	A7	ch48	B10
ch13	D7	ch49	C10
ch14	A8	ch50	B11
ch15	D8	ch51	C11
ch16	B1	ch52	B12
ch17	C1	ch53	C12
ch18	B2	ch54	B13
ch19	C2	ch55	C13
ch20	B3	ch56	B14
ch21	C3	ch57	C14
ch22	B4	ch58	B15
ch23	C4	ch59	C15
ch24	B5	ch60	B16
ch25	C5	ch61	C16
ch26	B6	ch62	B17
ch27	C6	ch63	C17
ch28	B7	1wref0	C9
ch29	C7	1wref1	C18
ch30	B8	com0+	A9
ch31	C8	com0–	B9
ch32	A10	com1+	A18

ch33	D10	com1–	B18
ch34	A11	cjtemp+	A25
ch35	D11	cjtemp–	D25

NI PXI-2527 2-Wire 32×1 Multiplexer Topology

Connect to the pins of the <u>NI TB-2627</u> terminal block to use the NI PXI-2527 as a <u>2-wire</u> 32×1 <u>multiplexer</u>. In this topology, all positive leads (CH0+ through CH31+) route to both COM0+ and COM1+; all negative leads (CH0– through CH31–) route to both COM0– and COM1–. The pair COM0+ and COM0– is addressed as com0 in software, and the pair COM1+ and COM1– is addressed as com1 in software. In this topology, COM0+ is connected to COM1+, and COM0– is connected to COM1–.

The following figure represents the NI PXI-2527 in the 2-wire 32×1 multiplexer topology.



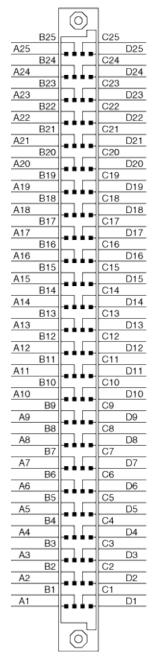
Legend: Software Name (Hardware Name)

Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections: signal connected to CH2+ is routed to COM0+

signal connected to CH2– is routed COM0–

The following figure and table identify the pins for the NI PXI-2527 in the 2-wire 32×1 multiplexer topology.



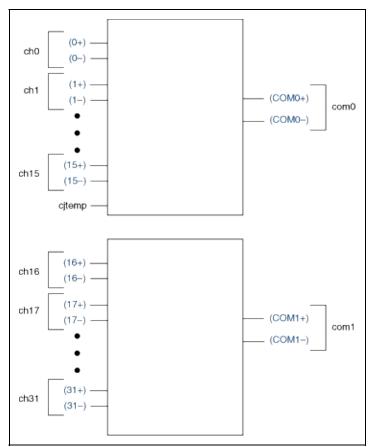
Pin Number		Software Name	Pin Number	
+	Ι	Sonware Mame	+	-
A1	B1	ch18	A11	B11
	+	+ –	+ _ Software Name	+ _ Software Name +

ch1	D1	C1	ch19	D11	C11
ch2	A2	B2	ch20	A12	B12
ch3	D2	C2	ch21	D12	C12
ch4	A3	B3	ch22	A13	B13
ch5	D3	C3	ch23	D13	C13
ch6	A4	B4	ch24	A14	B14
ch7	D4	C4	ch25	D14	C14
ch8	A5	B5	ch26	A15	B15
ch9	D5	C5	ch27	D15	C15
ch10	A6	B6	ch28	A16	B16
ch11	D6	C6	ch29	D16	C16
ch12	A7	B7	ch30	A17	B17
ch13	D7	C7	ch31	D17	C17
ch14	A8	B8	com0	A9	B9
ch15	D8	C8	com1	A18	B18
ch16	A10	B10	cjtemp	A25	D25
ch17	D10	C10			

NI PXI-2527 2-Wire Dual 16×1 Multiplexer Topology

Connect to the pins of the <u>NI TB-2627</u> terminal block to use the NI PXI-2527 as a <u>2-wire</u> dual 16×1 <u>multiplexer</u>. In this topology, CH0+ through CH15+ route to COM0+, and CH0– through CH15– route to COM0–. Additionally, CH16+ through CH31+ route to COM1+, and CH16– through CH31– route to COM1–. The pair COM0+ and COM0– is addressed as com0 in software, and the pair COM1+ and COM1– is addressed as com1 in software.

The following figure represents the NI PXI-2527 in the 2-wire dual 16×1 multiplexer topology.



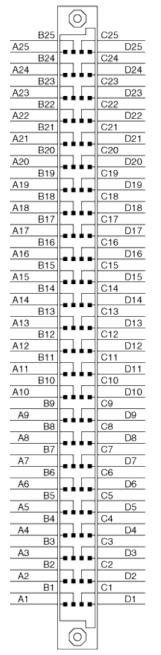
Legend: Software Name (Hardware Name)

Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections: signal connected to CH2+ is routed to COM0+

signal connected to CH2– is routed COM0–

The following figure and table identify the pins for the NI PXI-2527 in the 2-wire dual 16×1 multiplexer topology.



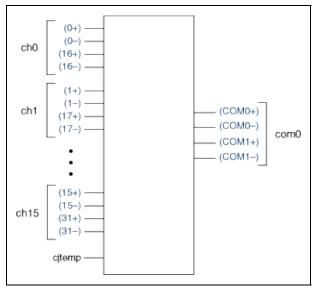
Software Name	Pin Number		Software Name	Pin Number	
Sonware Name	+	-	Soliware Name	+	-
ch0	A1	B1	ch18	A11	B11
ch1	D1	C1	ch19	D11	C11

ch2	A2	B2	ch20	A12	B12
ch3	D2	C2	ch21	D12	C12
ch4	A3	B3	ch22	A13	B13
ch5	D3	C3	ch23	D13	C13
ch6	A4	B4	ch24	A14	B14
ch7	D4	C4	ch25	D14	C14
ch8	A5	B5	ch26	A15	B15
ch9	D5	C5	ch27	D15	C15
ch10	A6	B6	ch28	A16	B16
ch11	D6	C6	ch29	D16	C16
ch12	A7	B7	ch30	A17	B17
ch13	D7	C7	ch31	D17	C17
ch14	A8	B8	com0	A9	B9
ch15	D8	C8	com1	A18	B18
ch16	A10	B10	cjtemp	A25	D25
ch17	D10	C10	-	-	-

NI PXI-2527 4-Wire 16×1 Multiplexer Topology

Connect to the pins of the <u>NI TB-2627</u> terminal block to use the NI PXI-2527 as a <u>4-wire</u> 16×1 <u>multiplexer</u>. In this topology, all positive "A" leads (CH0A+ through CH15A+) route to COM0+. All negative "A" leads (CH0A– through CH15A–) route to COM0–. All positive "B" leads (CH0B+ through CH15B+) route to COM1+. All negative "B" leads (CH0B– through CH15B–) route to COM1–. COM0+, COM0–, COM1+, and COM1– are addressed as com0 in software.

The following figure represents the NI PXI-2527 in the 4-wire 16×1 multiplexer topology.

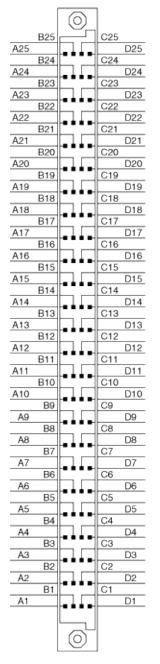


Legend: Software Name (Hardware Name)

Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connections: signal connected to CH2+ is routed to COM0+ signal connected to CH2– is routed to COM0– signal connected to CH18+ is routed to COM1+ signal connected to CH18– is routed to COM1–

The following figure and table identify the pins for the NI PXI-2527 in the 4-wire 16×1 multiplexer topology.

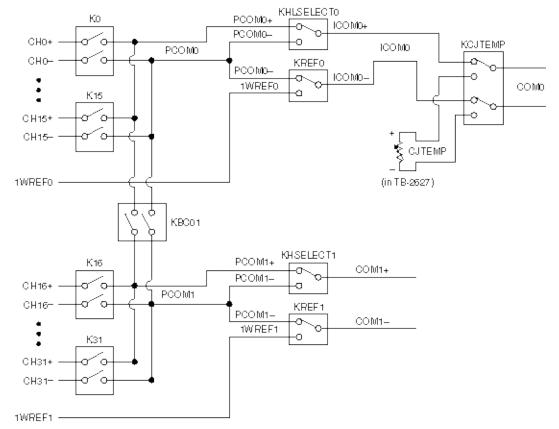


Software Name	Pin Number			
Soltware Name	A+	A –	B+	B-
ch0	A1	B1	A10	B10

ch1	D1	C1	D10	C10
ch2	A2	B2	A11	B11
ch3	D2	C2	D11	C11
ch4	A3	B3	A12	B12
ch5	D3	C3	D12	C12
ch6	A4	B4	A13	B13
ch7	D4	C4	D13	C13
ch8	A5	B5	A14	B14
ch9	D5	C5	D14	C14
ch10	A6	B6	A15	B15
ch11	D6	C6	D15	C15
ch12	A7	B7	A16	B16
ch13	D7	C7	D16	C16
ch14	A8	B8	A17	B17
ch15	D8	C8	D17	C17
com0	A9	B9	A18	B18
cjtemp	A25	D25		

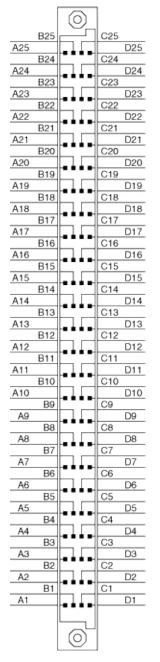
NI PXI-2527 Independent Topology

When using the NI PXI-2527 in the independent topology, connect the signals using the <u>NI TB-2627</u> terminal block. Select this topology to utilize the full routing capabilities of the NI PXI-2527.



With the independent topology, you can control the individual relays using the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function, or you can use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

The following figure and table identify the pins for the NI PXI-2527 in the independent topology.



Software Name	Pin N	umber	Software Name	Pin Number	
Software Name	+	_	Soltware Name	+	_
ch0	A1	B1	ch17	D10	C10

ch1	D1	C1	ch18	A11	B11
ch2	A2	B2	ch19	D11	C11
ch3	D2	C2	ch20	A12	B12
ch4	A3	B3	ch21	D12	C12
ch5	D3	C3	ch22	A13	B13
ch6	A4	B4	ch23	D13	C13
ch7	D4	C4	ch24	A14	B14
ch8	A5	B5	ch25	D14	C14
ch9	D5	C5	ch26	A15	B15
ch10	A6	B6	ch27	D15	C15
ch11	D6	C6	ch28	A16	B16
ch12	A7	B7	ch29	D16	C16
ch13	D7	C7	ch30	A17	B17
ch14	A8	B8	ch31	D17	C17
ch15	D8	C8	com0	A9	B9
ch16	A10	B10	com1	A18	B18
cjtemp	A25	D25			

The following is a list of the valid internal channel names:

pcom0	pcom1
1wref0	1wref1
cjtemp	icom0
pcom1plus	pcom1minus
icom0plus	icom0minus
pcom0plus	pcom0minus
com1plus	com1minus

Thermocouple Measurement

The NI PXI-2527 and the <u>NI TB-2627</u> can measure thermocouples.

Tip NI software can convert a thermocouple voltage to the thermocouple temperature. For example code, visit <u>ni.com/zone</u>, click the Example Code link in the navigation bar, and enter **PXI**-**2527** in the Search field.

When measuring thermocouples, be sure to account for error in the measurements. The total error in thermocouple measurement is the sum of the system error (determined by the thermal EMF of the NI PXI-2527 and the CJC temperature of the NI TB-2627) and the thermocouple error (determined by the type of thermocouple used).

Determining the System Error

To determine the system error for the NI PXI-2527/TB-2627, first calculate the thermal EMF error of the NI PXI-2527 using the following equation.

$$E_{EMF} = [(T_{+1} - T) / (V_{+1} - V)] \times V_{EMF}$$
(1)

where E_{EMF} represents the thermal EMF error of the NI PXI-2527

T is the temperature being measured, in degrees Celsius

 T_{+1} is (T + 1 °C)

V is the voltage that corresponds to T

 V_{+1} is the voltage that corresponds to T_{+1}

 V_{EMF} represents the thermal EMF of the NI PXI-2527



Notes In thermocouple reference tables, *T* and T_{+1} are known values used to calculate the slope of the thermocouple Temperature *vs.* Voltage graph. Refer to a thermocouple reference table to determine the values of *V* and V_{+1} that correspond to *T* and T_{+1} , respectively.

Refer to the *NI PXI-2527 Specifications* to determine the thermal EMF value of the NI PXI-2527. For optimal thermocouple measurement performance (V_{EMF} = 2.5 µV), power down the latching relays of the NI PXI-2527. For more information about powering down latching relays, refer to the <u>Power Down Latching</u> Relays After Debounce property in NI-SWITCH or the Power Down Latching Relays After Settling property in NI-DAQmx.

After you have determined the thermal EMF error using Equation 1, calculate the system error using the following equation.

$$E_S = E_{EMF} + E_{CJC} \tag{2}$$

where E_S represents the system error of the NI PXI-2527/TB-2627

 E_{EMF} represents the error due to thermal EMF of the NI PXI-2527 E_{CJC} represents the error due to CJC temperature sensor of the NI TB-2627

Example

Measuring a K-type thermocouple at 200 $^{\circ}$ C with a CJC temperature of 25 $^{\circ}$ C, the system error of the NI PXI-2527/TB-2627 is calculated in the following example.

Assuming typical thermal EMF (2.5 μ V), first calculate the error due to thermal EMF using Equation 1.

 $E_{EMF} = [(201 \ ^{\circ}\text{C} - 200 \ ^{\circ}\text{C})/(8.178 \ \mu\text{V} - 8.138 \ \mu\text{V})] \times 0.0025 \ \mu\text{V}$ = 0.063 \ ^{\circ}\text{C}

Note In this example, the values of V and V_{+1} are found in the thermocouple reference tables of Omega Engineerings *The Temperature Handbook*. Vol. 29. Stamford, CT: Omega Engineering Inc, 1995.

To determine the system error, add the error due to thermal EMF to the error due to the CJC temperature sensor using Equation 2.

 $E_{\rm S} = 0.063 \,^{\circ}\text{C} + 0.5 \,^{\circ}\text{C}$

= 0.563 °C

Determining the Thermocouple Error

Independent of the NI PXI-2527/TB-2627 system, thermocouple error is the greater of the following values: \pm a temperature range or \pm a percent of the measurement.

In the example, a standard grade K-type thermocouple is used to measure 200 °C. *The Temperature Handbook* lists the error for a standard grade K-type thermocouple as ± 2.2 °C or $\pm 0.75\%$ of the measurement temperature. Because $\pm 0.75\%$ of 200 °C (± 1.5 °C) is less than ± 2.2 °C, the error of a standard grade K-type thermocouple is ± 2.2 °C.

Determining the Total Error

The total error in thermocouple measurement is the sum of the system error and the thermocouple error. Use the following equation to determine the total error in thermocouple measurement.

$$E_T = E_S + E_{Th} \tag{3}$$

where E_T represents the total error in thermocouple measurement

 E_{S} represents the system error

 E_{Th} represents the thermocouple error

To determine the total error in thermocouple measurement in the <u>example</u>, add the thermocouple error to the system error using Equation 3, as illustrated in the following calculation.

 $E_T = 0.56 \text{ °C} + 2.2 \text{ °C}$

= 2.76 °C

Assuming typical thermal EMF, the total error in thermocouple measurement at 200 $^{\circ}$ C for the NI PXI-2527/TB-2627 with a K-type thermocouple is ±2.76 $^{\circ}$ C.

NI PXI-2527 Triggering

The NI PXI-2527 recognizes trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2527.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2527.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2527 Relay Replacement

The NI PXI-2527 uses electromechanical armature relays.

Refer to the following tables for information about ordering replacement relays.

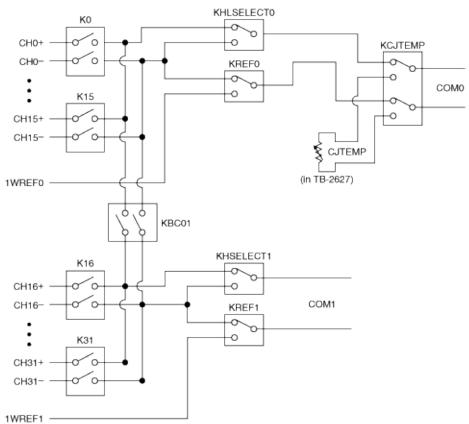
Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

Relay Kit	Part Number
National Instruments (10 relays)	779356-01

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Refer to the following figure and table to locate the relay you want to replace.



NI PXI-2527 Hardware Diagram

Note Use the numbers printed on the board to verify the revision letter of the NI PXI-2527. (Revision B = ASSY192245B-01; Revision A = ASSY192245A-01.) Use the revision letter to determine the correct reference designator for the relay you want to replace.

Relay Name Reference Designator Reference Designator

	(Revision B)	(Revision A)
k0	k0	k33
k1	k1	k35
k2	k2	k30
k3	k3	k38
k4	k4	k34
k5	k5	k29
k6	k6	k25
k7	k7	k24
k8	k8	k21
k9	k9	k20
k10	k10	k17
k11	k11	k31
k12	k12	k16
k13	k13	k37
k14	k14	k36
k15	k15	k26
k16	k16	k13
k17	k17	k22
k18	k18	k6
k19	k19	k18
k20	k20	k14
k21	k21	k11
k22	k22	k8
k23	k23	k12
k24	k24	k9
k25	k25	k7
k26	k26	k5
k27	k27	k10
k28	k28	k1

k29	k29	k3
k30	k30	k4
k31	k31	k2
kbc01	k32	k32
khlselect0	k33	k28
kref0	k34	k27
khlselect1	k35	k23
kref1	k36	k19
kcjtemp	k37	k15

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

P

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2529

The NI PXI-2529 is a 128 crosspoint, high-density matrix switch module for the PXI platform. The NI PXI-2529 is designed for switching low and high voltages. For low-voltage measurements, the NI PXI-2529 uses relays with <9 μ V thermal offset to ensure accurate measurements.



Note For EMC compliance, operate this device with shielded cables.

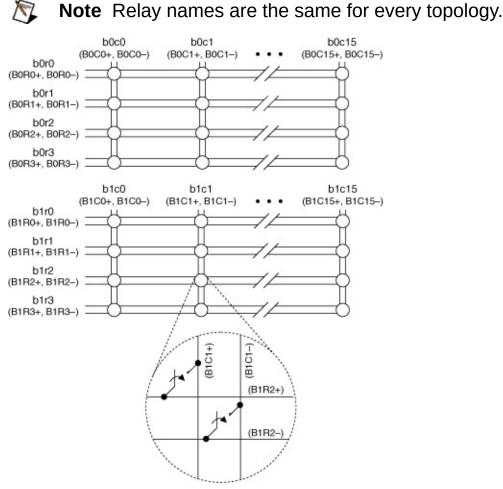
Operation Modes

The following table lists the supported topologies of the NI PXI-2529 and possible <u>operation modes</u>.

Topology	Software Name
<u>2-Wire</u> Dual <u>4×16</u> Matrix	2529/2-Wire Dual 4x16 Matrix (NISWITCH_TOPOLOGY_2529_2_WIRE_DUAL_4X16_MATF
<u>2-Wire</u> <u>8×16</u> Matrix	2529/2-Wire 8x16 Matrix (NISWITCH_TOPOLOGY_2529_2_WIRE_8X16_MATRIX)
<u>2-Wire</u> <u>4×32</u> <u>Matrix</u>	2529/2-Wire 4x32 Matrix (NISWITCH_TOPOLOGY_2529_2_WIRE_4X32_MATRIX)

NI PXI-2529 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2529.

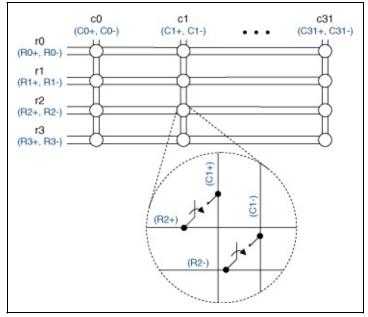


The following table lists relay names for the NI PXI-2529.

Bank 1 Relays	Bank 2 Relays
B0R0C0B0R0C15	B1R0C0B1R0C15
B0R1C0B0R1C15	B1R1C0B1R1C15
B0R2C0B0R2C15	B1R2C0B1R2C15
B0R3C0B0R3C15	B1R3C0B1R3C15

NI PXI-2529 2-Wire 4×32 Matrix Topology

The <u>NI TB-2634</u> or the <u>NI TB-2636</u> terminal block creates a <u>2-wire</u> 4×32 <u>matrix</u> topology with the NI PXI-2529. The following figure represents the NI PXI-2529 in the 2-wire 4×32 matrix topology.



Legend: Software Name (Hardware Name)

Making a Connection

The NI PXI-2529 combined with the NI TB-2634 or the NI TB-2636 creates a 4×32 matrix. In this topology, you can connect any row to any column. When connecting signals to r1, you would connect them to R1+ and R1– in the terminal block. When connecting signals to c0, you would connect them to C0+ and C0– in the terminal block.

You can connect the channels of the NI PXI-2529 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect row 1 to column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to r1 and the **channel 2** parameter set to c1.

When scanning the NI PXI-2529 in 4×32 matrix topology, a typical scan list entry could be r1->c20;. This entry routes the signal connected to row 1 to column 20.

Bank Connection Diagram

8	C15	C16	31
	Щ	шш	шшш
R0 BANK 0		B/	NK 1

Terminal Block Connections

The NI TB-2634 terminal block creates the following connections or relabels pins to operate the NI PXI-2529 as a 2-wire 4×32 matrix topology. Refer to the following pinout for pin locations.

The following table lists the pins of the NI TB-2634 shorts and the column connection created.

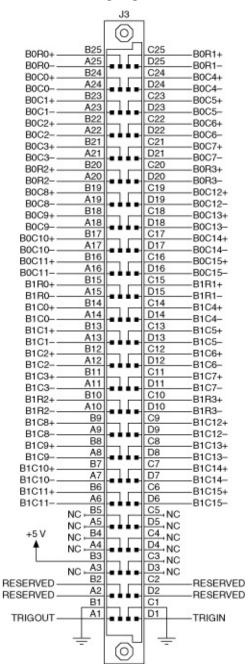
Connection	Pins	Connection	Pins	Connection	Pins	Connection	Pin
C0+	B24	C8+	B19	C16+	B14	C24+	B9
C0-	A24	C8-	A19	C16-	A14	C24-	A9
C1+	B23	C9+	B18	C17+	B13	C25+	B8
C1-	A23	C9-	A18	C17-	A13	C25-	A8
C2+	B22	C10+	B17	C18+	B12	C26+	B7
C2-	A22	C10-	A17	C18-	A12	C26-	A7
C3+	B21	C11+	B16	C19+	B11	C27+	B6
C3+	A21	C11-	A16	C19-	A11	C27-	A6
C4+	C24	C12+	C19	C20+	C14	C28+	C9
C4-	D24	C12-	D19	C20-	D14	C28-	D9
C5+	C23	C13+	C18	C21+	C13	C29+	C8
C5-	D23	C13-	D18	C21-	D13	C29-	D8
C6+	C22	C14+	C17	C22+	C12	C30+	C7
C6-	D22	C14-	D17	C22-	D12	C30-	D7
C7+	C21	C15+	C16	C23+	C11	C31+	C6
C7-	D21	C15-	D16	C23-	D11	C32-	D6

The following table lists the pins of the NI TB-2634 shorts and the row connection created.

Connection	Pins	Connection	Pins	Connection	Pins	Con
R0+	B25,B15	R1+	C25,C15	R2+	B20,B10	R3+
R0-	A25,A15	R1-	D25,D15	R2-	A20,A10	R3-

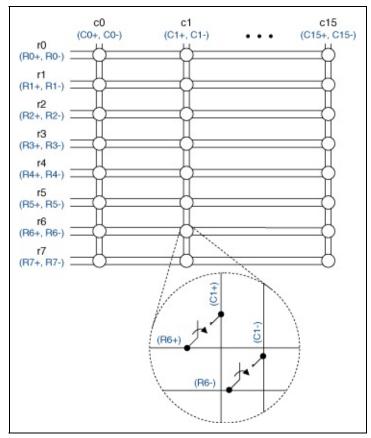
Pinout

The following figure identifies the pins for the NI PXI-2529.



NI PXI-2529 2-Wire 8×16 Matrix Topology

The <u>TB-2635</u> terminal block creates a <u>2-wire</u> 8×16 <u>matrix</u> topology with the NI PXI-2529. The following figure represents the NI PXI-2529 in the 2-wire 8×16 matrix topology.



Legend: Software Name (Hardware Name)

Making a Connection

The NI PXI-2529 combined with the NI TB-2635 creates an 8×16 matrix. In this topology you can connect any row to any column. When connecting signals to r1, you would connect them to R1+ and R1– in the terminal block. When connecting signals to c0, you would connect them to C0+ and C0– in the terminal block.

You can connect the channels of the NI PXI-2529 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect row 1 to column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to r1 and the **channel 2** parameter set to c1.

When scanning the NI PXI-2529 in 8×16 matrix topology, a typical scan list entry could be r5->c1;. This entry routes the signal connected to row 5 to column 1.

Bank Connection Diagram

8	C15
Щ	
R0 =	BANK 0
R3 –	
ы Ц	
R4	BANK 1
R7 -	

Terminal Block Connections

The NI TB-2635 terminal block creates the following connections or relabels pins to operate the NI PXI-2529 as a 2-wire 8×16 matrix. Refer to the **Pinout** below for pin locations.

The following table lists the pins the NI TB-2635 terminal block shorts and the column connections created. If you do not use the NI TB-2635 terminal block, the pins can be shorted externally.

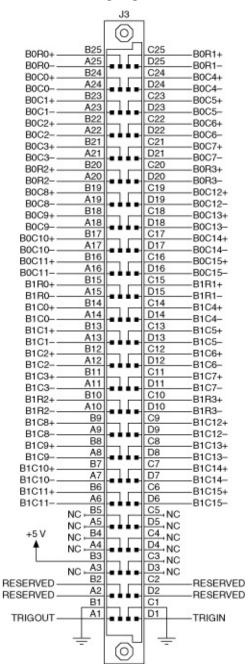
Connection	Pins	Connection	Pins	Connection	Pins	Conn
C0+	B24, B14	C4+	C24,C14	C8+	B19,B9	C12+
C0-	A24,A14	C4-	D24,D14	C8-	A19,A9	C12-
C1+	B23,B13	C5+	C23,C13	C9+	B18,B8	C13+
C1-	A23,A13	C5-	D23,D13	C9-	A18,A8	C13-
C2+	B22,B12	C6+	C22,C12	C10+	B17,B7	C14+
C2-	A22,A12	C6-	D22,D12	C10-	A17,A7	C14-
C3+	B21,B11	C7+	C21,C11	C11+	B16,B6	C15+
C3-	A21,A11	C7-	D21,D11	C11-	A16,A6	C15-

The following table lists the pins and their associated row connection.

Connection	Pins	Connection	Pins	Connection	Pins	Connection	Pin
R0+	B25	R2+	B20	R4+	B15	R6+	B1(
R0-	A25	R2-	A20	R4-	A15	R6-	A1(
R1+	C25	R3+	C20	R5+	C15	R7+	C1(
R1-	D25	R3-	D20	R5-	D15	R7-	D1(

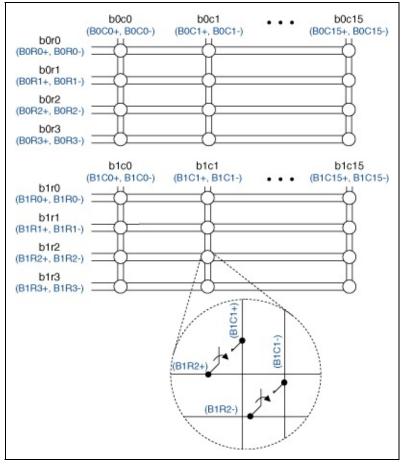
Pinout

The following figure identifies the pins for the NI PXI-2529.



NI PXI-2529 2-Wire Dual 4×16 Matrix Topology

The following figure represents the NI PXI-2529 in the $\frac{2-\text{wire}}{\text{matrix}}$ dual 4×16 matrix topology.



Legend: Software Name (Hardware Name)

Making a Connection

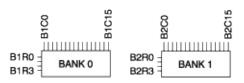
The NI PXI-2529 in this topology creates two banks of 4×16 matrices. You can only connect rows and columns to rows and columns in the same bank.

You can connect the channels of the NI PXI-2529 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect bank 0 row 1 to bank 0 column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to b0r1 and the **channel 2** parameter set to b0c1.

When scanning the NI PXI-2529 in dual 4×16 matrix topology, a typical scan list entry could be b0r1-b0c1;. This entry routes the signal connected to bank 0 row 1 to bank 0 column 1.

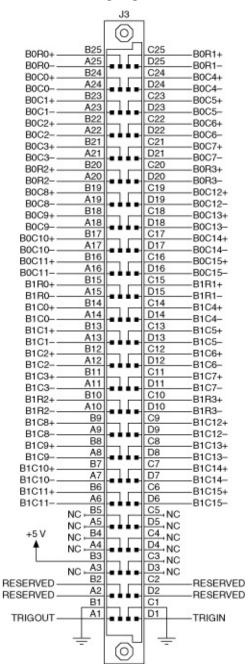
Note You can, for example, connect b0r1 to b0c0; however, you cannot connect b0r1 directly to b1c1 in this topology. When connecting signals to b0r1, you would connect them to B0R1+ and B0R1- in the terminal block. When connecting signals to b0c0, you would connect them to B0C0+ and B0C0- in the terminal block.

Bank Connection Diagram



Pinout

The following figure identifies the pins for the NI PXI-2529.



NI PXI-2529 Matrix Expansion

You can expand the NI PXI-2529 matrix using either the <u>NI TB-2634</u>, <u>NI TB-2635</u>, or the <u>NI TB-2636</u> terminal block. The terminal block you are using determines the matrix expansion procedure you will follow. The following table lists the terminal blocks and matrix topologies available for the NI PXI-2529.

Terminal Block	Topology (Row x Column)		
<u>NI TB-2634</u>	2-wire 4×32, 2-wire dual 4×16		
<u>NI TB-2635</u>	2-wire 8×16		
<u>NI TB-2636</u>	2-wire 4×32		

Expanding the NI PXI-2529 Matrix Using the NI TB-2634

The $\underline{NI TB-2634}$ ships with three 2×16 ribbon cable connectors. You will need to supply and attach your own ribbon cables.

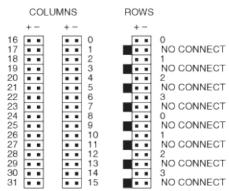
Getting Started

To expand the NI PXI-2529, you need the following items:

- Ribbon cable connectors
- Ribbon cable
- Two or more NI TB-2634 terminal blocks
- Two or more NI PXI-2529 switch modules

NI TB-2634 Terminal Reference

Refer to the following figure and complete either Expanding the NI PXI-2529 Columns or Expanding the NI PXI-2529 Rows to expand the NI PXI-2529.

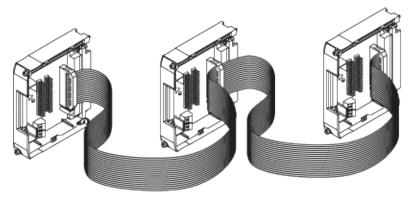


Expanding the NI PXI-2529 Columns

Complete the following steps to expand the columns of an NI PXI-2529 using an NI TB-2634 terminal block.

- 1. Connect one end of the ribbon cable to the row ribbon cable header on one NI TB-2634.
- 2. Connect the ribbon cable to the row ribbon cable header on another NI TB-2634.
- 3. (Optional) To expand the columns on the NI PXI-2529 further, attach another connector to the ribbon cable, and repeat the previous step.

The following figure illustrates the NI TB-2634 connections necessary to create a 2-wire 4×96 matrix.



Expanding the NI PXI-2529 Rows

Complete the following steps to expand the rows of an NI PXI-2529 using an NI TB-2634 terminal block.

- 1. Connect one end of the ribbon cable to the first column ribbon cable header on one NI TB-2634.
- 2. Connect the ribbon cable to the first column ribbon cable header on another NI TB-2634.
- 3. (Optional) To expand the rows on the NI PXI-2529 further, attach another connector to the ribbon cable, and repeat the previous step.
- 4. Repeat the previous steps to connect the second column ribbon cable headers on the NI TB-2634 terminal blocks.

Expanding the NI PXI-2529 Matrix Using the NI TB-2635

Use the <u>NI TB-2635</u> and bare wire to expand the NI PXI-2529.

Getting Started

To expand the NI PXI-2529, you need the following items:

- Bare wire
- Two or more NI TB-2635 terminal blocks
- Two or more NI PXI-2529 switch modules

NI TB-2635 Terminal Reference

Refer to the following figure and complete either Expanding the NI PXI-2529 Columns or Expanding the NI PXI-2529 Rows to expand the NI PXI-2529.

COLUM	NS	ROWS
$ \begin{array}{c c} & \Box & 4+ \\ 0 & \Box & 4- \\ 0 & \Box & 5+ \\ 0 & \Box & 5- \\ 0 & \Box & 6+ \\ 0 & \Box & 6- \\ 0 & \Box & 7+ \\ 0 & \Box & 7- \\ \end{array} $	$ \begin{array}{c c} 0 & \square & 0+ \\ 0 & \square & 0- \\ 0 & \square & 1+ \\ 0 & \square & 1- \\ 0 & \square & 2+ \\ 0 & \square & 2- \\ 0 & \square & 3+ \\ 0 & \square & 3- \\ \end{array} $	$ \begin{array}{c c} 0 & - & 0 + \\ 0 & - & 0 - \\ 0 & - & 1 + \\ 0 & - & 1 - \\ 0 & - & 2 + \\ 0 & - & 2 - \\ 0 & - & 3 + \\ 0 & - & 3 - \\ \end{array} $
0 0 8+ 0 9+ 0 9- 0 10+ 0 10- 0 11+ 0 11-	0 12+ 0 12- 0 13+ 0 13- 0 14+ 0 14+ 0 15+ 0 15-	- 0 0 4- - 0 5+ - 0 5- - 0 6+ - 0 6- - 0 7+

Expanding the NI PXI-2529 Columns

Complete the following steps to expand the columns of an NI PXI-2529 using an NI TB-2635 terminal block.

- 1. Connect one end of the bare wire to a row screw terminal on one NI TB-2635.
- 2. Connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2635.
- 3. (Optional) To expand the columns on the NI PXI-2529 further, attach another bare wire to the row screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2635.
- 4. Repeat the previous steps for all rows.

Expanding the NI PXI-2529 Rows

Complete the following steps to expand the rows of an NI PXI-2529 using an NI TB-2635 terminal block.

- 1. Connect one end of the bare wire to a column screw terminal on one NI TB-2635.
- 2. Connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2635.
- 3. (Optional) To expand the rows on the NI PXI-2529 further, attach another bare wire to the column screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2635.
- 4. Repeat the previous steps for all columns.

Expanding the NI PXI-2529 Matrix Using the NI TB-2636

Use the <u>NI TB-2636</u> and bare wire to expand the NI PXI-2529.

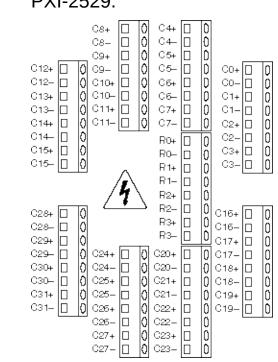
Getting Started

To expand the NI PXI-2529, you need the following items:

- Bare wire
- Two or more NI TB-2636 terminal blocks
- Two or more NI PXI-2529 switch modules

NI TB-2636 Terminal Reference

Refer to the following figure and complete either <u>Expanding the NI PXI-</u> 2529 Columns or <u>Expanding the NI PXI-2529 Rows</u> to expand the NI PXI-2529.



Expanding the NI PXI-2529 Columns

Complete the following steps to expand the columns of an NI PXI-2529 using an NI TB-2636 terminal block.

- 1. Connect one end of the bare wire to a row screw terminal on one NI TB-2636.
- 2. Connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2636.
- 3. (Optional) To expand the columns on the NI PXI-2529 further, attach another bare wire to the row screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2636.
- 4. Repeat the previous steps for all rows.

Expanding the NI PXI-2529 Rows

Complete the following steps to expand the rows of an NI PXI-2529 using an NI TB-2636 terminal block.

- 1. Connect one end of the bare wire to a column screw terminal on one NI TB-2636.
- 2. Connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2636.
- 3. (Optional) To expand the rows on the NI PXI-2529 further, attach another bare wire to the column screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2636.
- 4. Repeat the previous steps for all columns.

NI PXI-2529 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2529.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIGIN on TB- 2634/2635 terminal blocks

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2529.

Scan Advanced Output	Software	Hardware	
None	None (NISWITCH_VAL_NONE)	N/A	
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0	
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1	
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2	
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3	
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4	
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5	
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6	
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7	
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIGOUT on TB- 2634/2635 terminal blocks	

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2529 Relay Replacement

The NI PXI-2529 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part	
Aromat (NAiS)	AGQ210A4H	

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - **Note** Properly grounding yourself prevents damage to M your module from electrostatic discharge.
- 2. Locate the relay you want to replace.
 - a. Determine the channel name for the relay using the Bank Connection Diagram for your topology.
 - b. Match the channel name to its corresponding relay name using the following tables.

Channel Relay Channel Relay Channel Relay Cha						
Name	Name	Name	Name	Name	Name	Ni
B0ROC0	K72	B0R1C0	K80	B0R2CO	K88	BOF
B0ROC1	K71	B0R1C1	K79	B0R2C1	K87	B0F
B0ROC2	K70	B0R1C2	K78	B0R2C2	K86	B0F
B0ROC3	K69	B0R1C3	K77	B0R2C3	K85	B0F
B0ROC4	K1	B0R1C4	K9	B0R2C4	K17	B0F
B0ROC5	K2	B0R1C5	K10	B0R2C5	K18	B0F
B0ROC6	K3	B0R1C6	K11	B0R2C6	K19	B0F
B0ROC7	K4	B0R1C7	K12	B0R2C7	K20	B0F
B0ROC8	K68	B0R1C8	K76	B0R2C8	K84	B0F
B0ROC9	K67	B0R1C9	K75	B0R2C9	K83	B0F
B0ROC10	K66	B0R1C10	K74	B0R2C10	K82	B0F
B0ROC11	K65	B0R1C11	K73	B0R2C11	K81	B0F
B0ROC12	K5	B0R1C12	K13	B0R2C12	K21	B0F
B0ROC13	K6	B0R1C13	K14	B0R2C13	K22	B0F
B0ROC14	K7	B0R1C14	K15	B0R2C14	K23	B0F
B0ROC15	K8	B0R1C15	K16	B0R2C15	K24	B0F
					-	

Daughterboard Relay Locations (Top View)

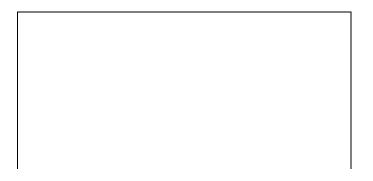
Daughterboard Relay Locations (Bottom View)					

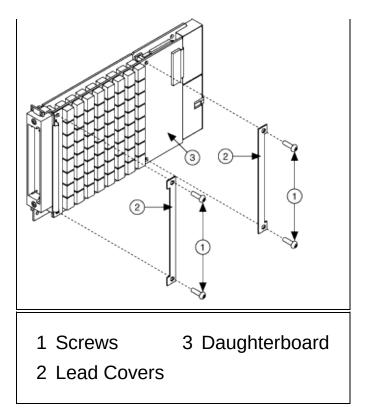
Channel Name	Relay Name	Channel Name	Relay Name	Channel Name	Relay Name	Chi Ni
B1ROC0	K104	B1R1C0	K112	B1R2CO	K120	B1F
B1ROC1	K103	B1R1C1	K111	B1R2C1	K119	B1F
B1ROC2	K102	B1R1C2	K110	B1R2C2	K118	B1F
B1ROC3	K101	B1R1C3	K109	B1R2C3	K117	B1F
B1ROC4	K33	B1R1C4	K41	B1R2C4	K49	B1F
B1ROC5	K34	B1R1C5	K42	B1R2C5	K50	B1F
B1ROC6	K35	B1R1C6	K43	B1R2C6	K51	B1F
B1ROC7	K36	B1R1C7	K44	B1R2C7	K52	B1F
B1ROC8	K100	B1R1C8	K108	B1R2C8	K116	B1F
B1ROC9	K99	B1R1C9	K107	B1R2C9	K115	B1F
B1ROC10	K98	B1R1C10	K106	B1R2C10	K114	B1F
B1ROC11	K97	B1R1C11	K105	B1R2C11	K113	B1F
B1ROC12	K37	B1R1C12	K45	B1R2C12	K53	B1F
B1ROC13	K38	B1R1C13	K46	B1R2C13	K54	B1F
B1ROC14	K39	B1R1C14	K47	B1R2C14	K55	B1F
B1ROC15	K40	B1R1C15	K48	B1R2C15	K56	B1F

c. Use the relay name to locate the relay on the daughterboard.

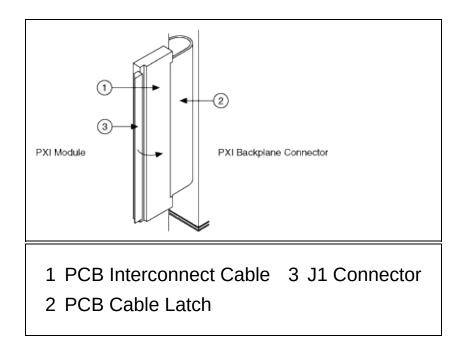
Note Relay names are printed on the PCB.

3. To replace relay K1, K8, K9, K16, K17, K24, K25, K32, K33, K40, K41, K48, K49, K56, K57, or K64, remove the four screws and two lead covers that secure the daughterboard to the switch assembly.





4. To gain access the bottom of the daughterboard, disconnect the PCB interconnect cable by lifting the PCB cable latch on the J1 connector.



Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

P

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2530

The NI PXI-2530 is a high-density <u>multiplexer/matrix</u> switch module for the PXI platform. The NI PXI-2530 uses <u>reed relays</u>.

A number of factors can affect the life expectancy of reed relays. Refer to <u>Reed Relay Protection</u> for information about protecting the reed relays on the NI PXI-2530.

Refer to <u>Signal Connections</u> for pinouts for each topology.

Operation Modes

The following table lists the supported topologies of the NI PXI-2530 and possible <u>operation modes</u>.

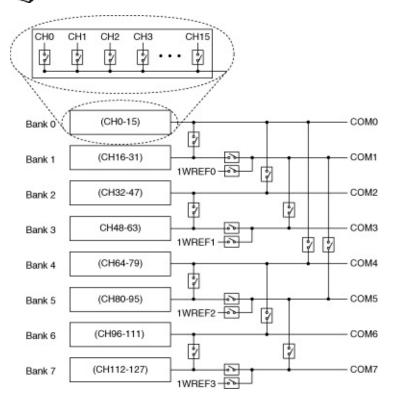
Topology	Software Name
<u>1-Wire</u> <u>128×1</u> Multiplexer	2530/1-Wire 128x1 Mux (NISWITCH_TOPOLOGY_2530_1_WIRE_128X1_MUX)
<u>1-Wire Dual</u> <u>64×1</u> <u>Multiplexer</u>	2530/1-Wire Dual 64x1 Mux (NISWITCH_TOPOLOGY_2530_1_WIRE_DUAL_64X1_MU
<u>1-Wire</u> Quad 32×1 Multiplexer	2530/1-Wire Quad 32x1 Mux (NISWITCH_TOPOLOGY_2530_1_WIRE_QUAD_32X1_MI
<u>1-Wire Octal</u> <u>16×1</u> Multiplexer	2530/1-Wire Octal 16x1 Mux (NISWITCH_TOPOLOGY_2530_1_WIRE_OCTAL_16X1_M
<u>2-Wire 64×1</u> <u>Multiplexer</u>	2530/2-Wire 64x1 Mux (NISWITCH_TOPOLOGY_2530_2_WIRE_64X1_MUX)
<u>2-Wire Dual</u> <u>32×1</u> Multiplexer	2530/2-Wire Dual 32x1 Mux (NISWITCH_TOPOLOGY_2530_2_WIRE_DUAL_32X1_MU
<u>2-Wire</u> Quad 16×1 Multiplexer	2530/2-Wire Quad 16x1 Mux (NISWITCH_TOPOLOGY_2530_2_WIRE_QUAD_16X1_MI
<u>4-Wire 32×1</u> <u>Multiplexer</u>	2530/4-Wire 32x1 Mux (NISWITCH_TOPOLOGY_2530_4_WIRE_32X1_MUX)
<u>4-Wire Dual</u> <u>16×1</u> Multiplexer	2530/4-Wire Dual 16x1 Mux (NISWITCH_TOPOLOGY_2530_4_WIRE_DUAL_16X1_ML
<u>1-Wire 4×32</u> <u>Matrix</u>	2530/1-Wire 4x32 Matrix (NISWITCH_TOPOLOGY_2530_1_WIRE_4X32_MATRIX)
<u>1-Wire 8×16</u> Matrix	2530/1-Wire 8x16 Matrix (NISWITCH TOPOLOGY 2530 1 WIRE 8X16 MATRIX)

2530/2-Wire 4x16 Matrix (NISWITCH_TOPOLOGY_2530_2_WIRE_4X16_MATRIX)
2530/Independent (NISWITCH_TOPOLOGY_2530_INDEPENDENT)

NI PXI-2530 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2530.

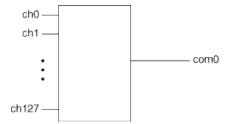
Note Refer to the <u>Independent Topology</u> section for relay names.



NI PXI-2530 1-Wire 128×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>1-wire</u> 128×1 <u>multiplexer</u>. In this topology, all channel terminals (CH0 through CH127) route to COM0. A reference, 1WREF0, always remains connected to COM1. The pair, COM0 and COM1, is provided for convenient connectivity to a 2-wire device, such as a DMM.

The following figure represents the NI PXI-2530 in the 1-wire 128×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connection:

signal connected to CH2 is routed to COM0

Signal Connections

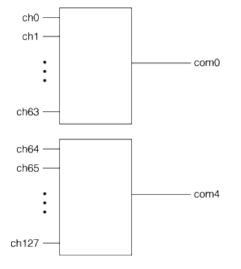
Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 1-Wire Dual 64×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>1-wire</u> dual 64×1 <u>multiplexer</u>. In this topology, channel terminals CH0 through CH63 route to COM0. A reference, 1WREF0, always remains connected to COM1.

Channel terminals CH64 through CH127 route to COM4. A reference, 1WREF2, always remains connected to COM5.

The following figure represents the NI PXI-2530 in the 1-wire dual 64×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connection:

signal connected to CH2 is routed to COM0

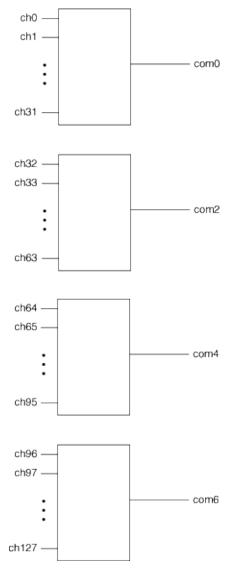
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 1-Wire Quad 32×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>1-wire</u> quad 32×1 <u>multiplexer</u>. In this topology, channel terminals CH0 through CH31 route to COM0. A reference, 1WREF0, always remains connected to COM1. All other banks follow a similar routing scheme.

The following figure represents the NI PXI-2530 in the 1-wire quad 32×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connection:

signal connected to CH2 is routed to COM0

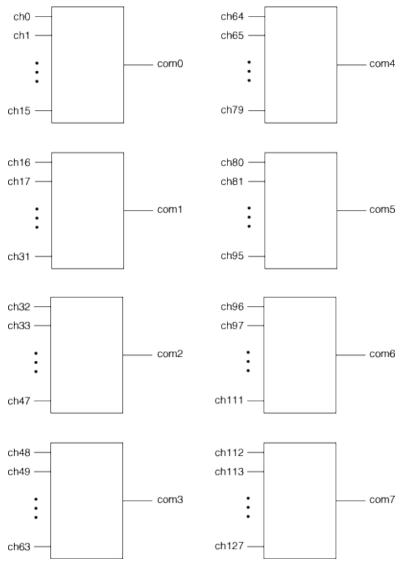
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 1-Wire Octal 16×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>1-wire</u> octal 16×1 <u>multiplexer</u>. In this topology, channel terminals CH0 through CH15 route to COM0. All other banks follow a similar routing scheme.

The following figure represents the NI PXI-2530 in the 1-wire octal 16×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connection:

signal connected to CH2 is routed to COM0

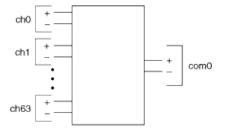
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 2-Wire 64×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>2-wire</u> 64×1 <u>multiplexer</u>. In this topology, all positive leads (CH0+ through CH63+) route to COM0+, and all negative leads (CH0– through CH63–) route to COM–. The pair COM0+ and COM– is addressed collectively as com0 in software.

The following figure represents the NI PXI-2530 in the 2-wire 64×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections: signal connected to CH2+ is routed to COM0+

signal connected to CH2- is routed to COM-

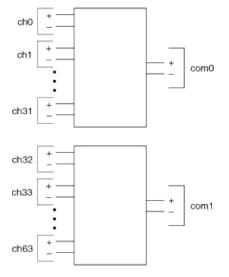
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 2-Wire Dual 32×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>2-wire</u> dual 32×1 <u>multiplexer</u>. In this topology, the positive leads of the first bank (CH0+ through CH31+) route to COM0+, and the negative leads of the first bank (CH0– through CH31–) route to COM–. The pair COM0 and COM1 is addressed collectively as com0 in software. The other bank follows a similar routing scheme.

The following figure represents the NI PXI-2530 in the 2-wire dual 32×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections: signal connected to CH2+ is routed to COM0+

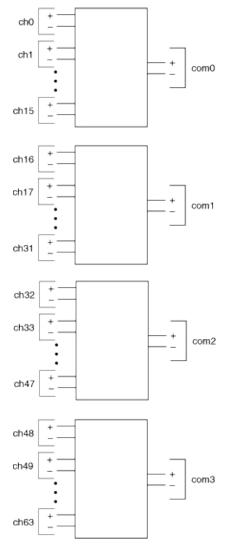
signal connected to CH2- is routed to COM-

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 2-Wire Quad 16×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>2-wire</u> quad 16×1 <u>multiplexer</u>. In this topology, the positive leads of the first bank (CH0+ through CH15+) route to COM0+, and the negative leads of the first bank (CH0– through CH15–) route to COM–. The pair COM0+ and COM– is addressed collectively as com0 in software. All other banks follow a similar routing scheme.

The following figure represents the NI PXI-2530 in the 2-wire quad 16×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections: signal connected to CH2+ is routed to COM0+

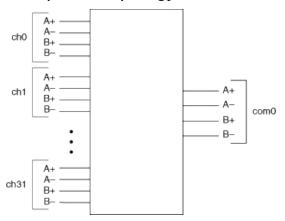
signal connected to CH2- is routed to COM-

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 4-Wire 32×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>4-wire</u> 32×1 <u>multiplexer</u>. In this topology, all positive "A" leads (CH0A+ through CH31A+) route to COM0A+. All negative "A" leads (CH0A– through CH31A–) route to COM0A–. All positive "B" leads (CH0B+ through CH31B+) route to COM0B+. All negative "B" leads (CH0B– through CH31B–) route to COM0B–. COM0A+, COM0A–, COM0B+, and COM0B– are addressed collectively as com0 in software.

The following figure represents the NI PXI-2530 in the 4-wire 32×1 multiplexer topology.



Making a Connection

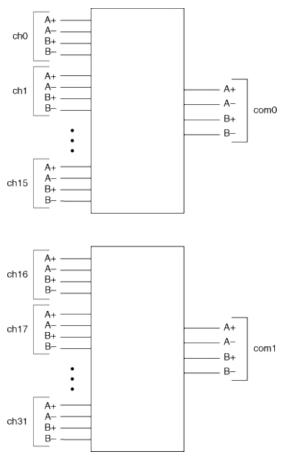
Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connections: signal connected to CH2A+ is routed to COM0A+ signal connected to CH2A– is routed to COM0A– signal connected to CH2B+ is routed to COM0B+ signal connected to CH2B– is routed to COM0B–

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 4-Wire Dual 16×1 Multiplexer Topology

Use the <u>NI TB-2630</u> terminal block with the NI PXI-2530 as a <u>4-wire</u> dual 16×1 <u>multiplexer</u>. In this topology, the positive "A" leads of the first bank (CH0A+ through CH15A+) route to COM0A+. The negative "A" leads of the first bank (CH0A– through CH15B–) route to COM0A–. The positive "B" leads of the first bank (CH0B+ through CH15B+) route to COM0B+. The negative "B" leads of the first bank (CH0B+ through CH15B+) route to COM0B+. The negative "B" leads of the first bank (CH0B– through CH15B–) route to COM0B+. COM0B+. COM0A+, COM0A–, COM0B+, and COM0B– are addressed collectively as com0 in software. The other bank follows a similar routing scheme.

The following figure represents the NI PXI-2530 in the 4-wire dual 16×1 multiplexer topology.



Making a Connection

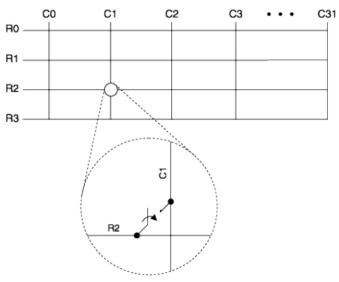
Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connections: signal connected to CH2A+ is routed to COM0A+ signal connected to CH2A– is routed to COM0A– signal connected to CH2B+ is routed to COM0B+ signal connected to CH2B– is routed to COM0B–

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 1-Wire 4×32 Matrix Topology

Use the NI TB-2631 terminal block with the NI PXI-2530 as a 1-wire 4×32 matrix.

The following figure represents the NI PXI-2530 in the 1-wire 4×32 matrix topology.



Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

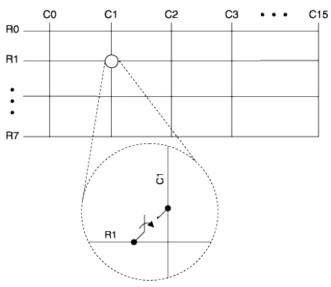
signal connected to R2 is routed to C1

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2631 terminal mapping.

NI PXI-2530 1-Wire 8×16 Matrix Topology

Use the NI TB-2632 terminal block with the NI PXI-2530 as a $\frac{1-\text{wire}}{\text{matrix}}$.

The following figure represents the NI PXI-2530 in the 1-wire 8×16 matrix topology.



Making a Connection

Both the scanning command, $r1 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r1 and c1, result in the following connection:

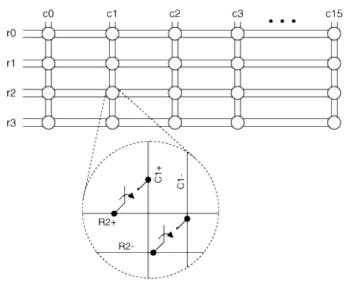
signal connected to R1 is routed to C1

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2632 terminal mapping.

NI PXI-2530 2-Wire 4×16 Matrix Topology

Use the NI TB-2631 terminal block with the NI PXI-2530 as a 2-wire 4×16 matrix.

The following figure represents the NI PXI-2530 in the 2-wire 4×16 matrix topology.



Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connections:

signal connected to R2+ is routed to C1+

signal connected to R2- is routed to C1-

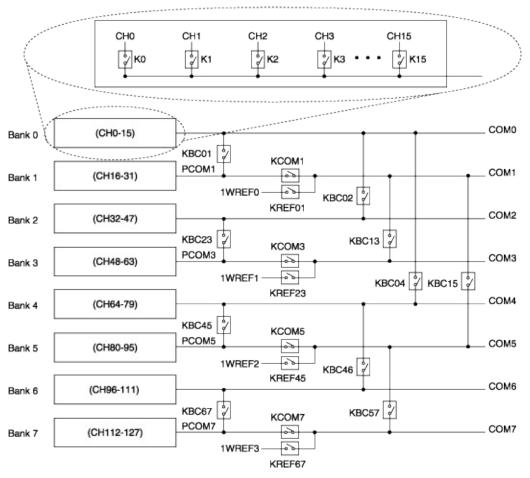
Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2631 terminal mapping.

NI PXI-2530 Independent Topology

R

When using the NI PXI-2530 in the independent topology, connect your signals using the <u>NI TB-2630</u> terminal block. Select this topology to utilize the full routing capabilities of the NI PXI-2530.

Note When using the independent topology, always select NONE in MAX for the terminal block.



With the independent topology, you can control the individual relays using the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function, or you can use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

Refer to the <u>Signal Connections</u> section for the NI PXI-2530 front connector pinout and NI TB-2630 terminal mapping.

NI PXI-2530 Matrix Expansion

You can expand the NI PXI-2530 matrix using either the <u>NI TB-2631</u> or <u>NI TB-2632</u> terminal block. The terminal block you are using determines the matrix expansion procedure you will follow. The following table lists the terminal blocks and matrix topologies available for the NI PXI-2530.

Terminal Block	Topology (Row x Column)			
<u>NI TB-2631</u>	1-wire 4×32, 2-wire 4×16			
<u>NI TB-2632</u>	1-wire 8×16			

Expanding the NI PXI-2530 Matrix Using the NI TB-2631

Use the <u>NI TB-2631</u> and bare wire to expand the NI PXI-2530.

Getting Started

To expand the NI PXI-2530, you need the following items:

- Bare wire
- Two or more NI TB-2631 terminal blocks
- Two or more NI PXI-2530 switch modules

NI TB-2631 Terminal Reference

Refer to the following figure and complete either Expanding the NI PXI-2530 Columns or Expanding the NI PXI-2530 Rows to expand the NI PXI-2530.

	COLUMNS						
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ROWS							
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	v v						
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	= □ 0 ≈ □ 0						
∾□0							
	z□0 800						
I 1-WIRE REFERENCE							

Expanding the NI PXI-2530 Columns

Complete the following steps to expand the columns of an NI PXI-2530 using an NI TB-2631 terminal block.

- 1. Connect one end of the bare wire to a row screw terminal on one NI TB-2631.
- 2. Connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2631.
- 3. (Optional) To expand the columns on the NI PXI-2530 further, attach another bare wire to the row screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2631.
- 4. Repeat the previous steps for all rows.

Expanding the NI PXI-2530 Rows

Complete the following steps to expand the rows of an NI PXI-2530 using an NI TB-2631 terminal block.

- 1. Connect one end of the bare wire to a column screw terminal on one NI TB-2631.
- 2. Connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2631.
- 3. (Optional) To expand the rows on the NI PXI-2530 further, attach another bare wire to the column screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2631.
- 4. Repeat the previous steps for all columns.

Expanding the NI PXI-2530 Matrix Using the NI TB-2632

Use the <u>NI TB-2632</u> and bare wire to expand the NI PXI-2530.

Getting Started

To expand the NI PXI-2530, you need the following items:

- Bare wire
- Two or more NI TB-2632 terminal blocks
- Two or more NI PXI-2530 switch modules

NI TB-2632 Terminal Reference

Refer to the following figure and complete either Expanding the NI PXI-2530 Columns or Expanding the NI PXI-2530 Rows to expand the NI PXI-2530.

	COLUMNS				
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ROWS					
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∾ □ 0	r □ 0				
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ა 🗆 🗘 ი 🗆 🗘	0				
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~ 🗆 🛛	ω□0				
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ω 🗆 🛛					
1-WIRE REFERENCE	1 1 0				

Expanding the NI PXI-2530 Columns

Complete the following steps to expand the columns of an NI PXI-2530 using an NI TB-2632 terminal block.

- 1. Connect one end of the bare wire to a row screw terminal on one NI TB-2632.
- 2. Connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2632.
- 3. (Optional) To expand the columns on the NI PXI-2530 further, attach another bare wire to the row screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding row screw terminal on another NI TB-2632.
- 4. Repeat the previous steps for all rows.

Expanding the NI PXI-2530 Rows

Complete the following steps to expand the rows of an NI PXI-2530 using an NI TB-2632 terminal block.

- 1. Connect one end of the bare wire to a column screw terminal on one NI TB-2632.
- 2. Connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2632.
- 3. (Optional) To expand the rows on the NI PXI-2530 further, attach another bare wire to the column screw terminal you accessed in the previous step, and connect the other end of the bare wire to the corresponding column screw terminal on another NI TB-2632.
- 4. Repeat the previous steps for all columns.

NI PXI-2530 Signal Connections

This book contains the pinout and signal connection information for the following types of topologies of the NI PXI-2530:

- <u>1-Wire Multiplexer Topologies</u>
- <u>2-Wire Multiplexer Topologies</u>
- <u>4-Wire Multiplexer Topologies</u>
- <u>1-Wire 4x32 Matrix Topology</u>
- <u>1-Wire 8x16 Matrix Topology</u>
- <u>2-Wire 4x16 Matrix Topology</u>
- Independent Topology

NI PXI-2530 1-Wire Multiplexer and Independent Topologies

The following figure and table identify the pins for the NI PXI-2530 in the 1-wire multiplexer and independent topologies.

		_	_	_				
133 -		f	Ŷ	Ŷ	o			1
134 -	89 -		ŗ	ř	0	-	45	2
135 -	90 -	-	ľ	Ľ	0-	-	46	3
136	91 -	-	j	Ľ	0	-	47	4
137 -	92 -	-	ŗ	ŕ	0	-	48	- 5
138 -	93 -	•	ľ	Ľ	0-	-	49	6
139 -	94 -		j	Ľ	0	L	50	7
140 -	95 -	•	_	Ľ	0	-	51	8
141 -	96 -	-	ŗ	Ľ	0	-	52	9
142 -	97 -	•	ľ	Ľ	0	-	53	10
143 -	98 -	-	ŗ	Ľ	0	-	54	11
144 -	99 -		ľ	Ľ	0-	E	55	12
145 -	100 -	•	Ľ	Ľ	0	-	56	13
146	101 -	6	j	Ľ	0	E	57	14
147	102 -	-0	ļ	Ľ	0-	-	58	15
148	103 -	-	ŗ	Ľ	0-	E	59	16
149	104 -		ľ	Ľ	0-	E	60	17
150 -	105 -			Ľ	0	-	61	18
151 -	106 -	-0	Ĵ	Ľ	0-	-	62	19
152 -	107 -	-	ڑ_ ا	Ĺ	0	-	63	20
153 -	108 -	-	_	_	0-	-	64	- 21
154 -	109 -	-0	Ľ	Ĺ	-	-	65	22
155 -	110 -	-0	Ĵ	Ĺ	0-	-	66	- 23
156 -	111 -	-	ļ	Ĺ	0-	E	67	24
157 -	112 -	-	Ĵ	Ĺ	-0-	-	68	- 25
158 -	113 -	-0	ļ	Ĺ	-	-	69	26
159 -	114 -	-0	Ľ	Ĺ	-0-	-	70	- 27
160	115 -	-	ſ	Ĺ	0-	E	71	28
161 -	116 -	-0	Ĵ	Ĺ	0-	-	72	- 29
162 ·	117 -	-	ļ	Ĺ	0	E	73	- 30
163 .	118 -	-0	Ľ	Ĺ	-	-	74	- 31
164 -	119 -	-0	Ľ	Ĺ	0	-	75	- 32
165 -	120 -	-	ľ	Ĺ	0	-	76	- 33
166 -	121 -	÷	Ĵ	Ĺ	0	-	77	- 34
167 -	122 -	-	Ľ	Ĺ	0-	-	78	- 35
168 -	123 -	•	Ĵ	Ĺ	-	-	79	- 36
169 -	124 -	-	Ĵ	Ĺ	0	-	80	37
170	125 -	Ŀ.	Ĵ	Ĺ	0-	-	81	38
171 -	126 -	Ē	Ľ	Ĺ	-	-	82	- 39
172 ·	127 -	-	Ĵ	Ĺ	-	-	83	
	128 -	•	Ĵ	Ĺ		-	84	40
173 -	129 -	•	Ĵ	Ĺ	•	-	85	41
174	130 -	•	Ľ	Ĺ	0-	-	86	42
175 -	131 -	•	Ĵ	Ĺ	0	-	87	43
176 ·	132 -	•	Ĵ	Ĺ	0-	-	88	- 44
		l						
		-	-					

Single 128x1	Dual 64x1	Quad 32x1	Octal 16x1	Independent	NI PXI-2530 Connector Pin Number	NI TB-2630 Terminal Name
com0	com0	com0	com0	com0	141	Bank 0, Pin 18
			com1	com1	97	Bank 1, Pin 18
		com2	com2	com2	114	Bank 2, Pin 18
			com3	com3	159	Bank 3, Pin 18
	com4	com4	com4	com4	9	Bank 4, Pin 18
			com5	com5	53	Bank 5, Pin 18
		com6	com6	com6	70	Bank 6, Pin 18
			com7	com7	27	Bank 7, Pin 18
				1wref0	150	Bank 0-1, Pin 17
				1wref1	123	Bank 2-3, Pin 17
				1wref2	18	Bank 4-5, Pin 17
				1wref3	79	Bank 6-7 Pin 17
		cł	0ר		133	Bank 0, Pin 1
		cł	า1		89	Bank 0, Pin 2
		cł	า2		134	Bank 0, Pin 3
		cł	า3		90	Bank 0, Pin

		4
ch4	135	Bank 0, Pin 5
ch5	91	Bank 0, Pin 6
ch6	136	Bank 0, Pin 7
ch7	92	Bank 0, Pin 8
ch8	137	Bank 0, Pin 9
ch9	93	Bank 0, Pin 10
ch10	138	Bank 0, Pin 11
ch11	94	Bank 0, Pin 12
ch12	139	Bank 0, Pin 13
ch13	95	Bank 0, Pin 14
ch14	140	Bank 0, Pin 15
ch15	96	Bank 0, Pin 16
ch16	142	Bank 1, Pin 1
ch17	98	Bank 1, Pin 2
ch18	143	Bank 1, Pin 3
ch19	99	Bank 1, Pin 4

ch20	144	Bank 1, Pin 5
ch21	100	Bank 1, Pin 6
ch22	145	Bank 1, Pin 7
ch23	101	Bank 1, Pin 8
ch24	146	Bank 1, Pin 9
ch25	102	Bank 1, Pin 10
ch26	147	Bank 1, Pin 11
ch27	103	Bank 1, Pin 12
ch28	148	Bank 1, Pin 13
ch29	104	Bank 1, Pin 14
ch30	149	Bank 1, Pin 15
ch31	105	Bank 1, Pin 16
ch32	106	Bank 2, Pin 1
ch33	151	Bank 2, Pin 2
ch34	107	Bank 2, Pin 3
ch35	152	Bank 2, Pin 4
ch36	108	Bank 2, Pin 5

ch37	153	Bank 2, Pin 6
ch38	109	Bank 2, Pin 7
ch39	154	Bank 2, Pin 8
ch40	110	Bank 2, Pin 9
ch41	155	Bank 2, Pin 10
ch42	111	Bank 2, Pin 11
ch43	156	Bank 2, Pin 12
ch44	112	Bank 2, Pin 13
ch45	157	Bank 2, Pin 14
ch46	113	Bank 2, Pin 15
ch47	158	Bank 2, Pin 16
ch48	115	Bank 3, Pin 1
ch49	160	Bank 3, Pin 2
ch50	116	Bank 3, Pin 3
ch51	161	Bank 3, Pin 4
ch52	117	Bank 3, Pin 5
ch53	162	Bank 3, Pin

		6
ch54	118	Bank 3, Pin 7
ch55	163	Bank 3, Pin 8
ch56	119	Bank 3, Pin 9
ch57	164	Bank 3, Pin 10
ch58	120	Bank 3, Pin 11
ch59	165	Bank 3, Pin 12
ch60	121	Bank 3, Pin 13
ch61	166	Bank 3, Pin 14
ch62	122	Bank 3, Pin 15
ch63	167	Bank 3, Pin 16
ch64	1	Bank 4, Pin 1
ch65	45	Bank 4, Pin 2
ch66	2	Bank 4, Pin 3
ch67	46	Bank 4, Pin 4
ch68	3	Bank 4, Pin 5
ch69	47	Bank 4, Pin 6

ch70	4	Bank 4, Pin 7
ch71	48	Bank 4, Pin 8
ch72	5	Bank 4, Pin 9
ch73	49	Bank 4, Pin 10
ch74	6	Bank 4, Pin 11
ch75	50	Bank 4, Pin 12
ch76	7	Bank 4, Pin 13
ch77	51	Bank 4, Pin 14
ch78	8	Bank 4, Pin 15
ch79	52	Bank 4, Pin 16
ch80	10	Bank 5, Pin 1
ch81	54	Bank 5, Pin 2
ch82	11	Bank 5, Pin 3
ch83	55	Bank 5, Pin 4
ch84	12	Bank 5, Pin 5
ch85	56	Bank 5, Pin 6
ch86	13	Bank 5, Pin

		7
ch87	57	Bank 5, Pin 8
ch88	14	Bank 5, Pin 9
ch89	58	Bank 5, Pin 10
ch90	15	Bank 5, Pin 11
ch91	59	Bank 5, Pin 12
ch92	16	Bank 5, Pin 13
ch93	60	Bank 5, Pin 14
ch94	17	Bank 5, Pin 15
ch95	61	Bank 5, Pin 16
ch96	62	Bank 6, Pin 1
ch97	19	Bank 6, Pin 2
ch98	63	Bank 6, Pin 3
ch99	20	Bank 6, Pin 4
ch100	64	Bank 6, Pin 5
ch101	21	Bank 6, Pin 6
ch102	65	Bank 6, Pin 7

ch103	22	Bank 6, Pin 8
ch104	66	Bank 6, Pin 9
ch105	23	Bank 6, Pin 10
ch106	67	Bank 6, Pin 11
ch107	24	Bank 6, Pin 12
ch108	68	Bank 6, Pin 13
ch109	25	Bank 6, Pin 14
ch110	69	Bank 6, Pin 15
ch111	26	Bank 6, Pin 16
ch112	71	Bank 7, Pin 1
ch113	28	Bank 7, Pin 2
ch114	72	Bank 7, Pin 3
ch115	29	Bank 7, Pin 4
ch116	73	Bank 7, Pin 5
ch117	30	Bank 7, Pin 6
ch118	74	Bank 7, Pin 7
ch119	31	Bank 7, Pin

		8
ch120	75	Bank 7, Pin 9
ch121	32	Bank 7, Pin 10
ch122	76	Bank 7, Pin 11
ch123	33	Bank 7, Pin 12
ch124	77	Bank 7, Pin 13
ch125	34	Bank 7, Pin 14
ch126	78	Bank 7, Pin 15
ch127	35	Bank 7, Pin 16

NI PXI-2530 2-Wire Multiplexer Topologies

The following figure and table identify the pins for the NI PXI-2530 in the 2-wire multiplexer topologies.

		_		
133 -		f• i	P 0 45	1
134 -	89 -	•	45	2
135 -	90 -	• •	46	3
136	91 -		47	4
137 -	92 -		48	5
138 -	93 -		49	6
139 -	94 -	-	50	7
140 -	95 -	-	L 51	8
141 -	96 -	-	L 52	9
142 -	97 -		53	10
143 -	98 -	-	L 54	11
144 -	99 -	-	55	12
145 -	100 -		56	13
146 -	101 -	-	57	14
147	102 -	<u> </u>	58	15
147 -	103 -		59	
	104 -	Ľ	60	16
149 -	105 -		61	17
150 -	106 -	Ľ	62	18
151 -	107 -	• <u>'</u>	63	19
152 -	108 -	2	64	20
153 -	109 -	2	65	21
154 -	110 -	<u>ٿ</u>	66	22
155 -	111 -	2	67	23
156 -	112 -	<u>°</u>	68	24
157 -	113 -	Ľ	69	25
158 -	114 -	2	70	26
159 -	115 -	<u>ث</u>	71	27
160 ·	116 -	2	72	28
161 -	117 -	2	73	29
162 -	118 -	<u>•</u>	74	30
163 -	119 -	<u>°</u>	75	31
164 -	120 -	<u>•</u> •	76	32
165 -		<u>•</u> •	9 0	33
166 -	121 -	- °	77	34
167 -	122 -	-• •	78	35
168 -	123 -	-	ρ - /9	36
169 -	124 -	- 9	φ o <u>ou</u>	37
170 ·	125 -		ρ <u>ο οι</u>	38
171 -	126 -	- • •	ρ o 82	39
172 -	127 -	• •	ρ - 83	40
173 -	128 -	• •	ρ o 04	41
174	129 -		P 0 85	42
175 -	130 -		9 0 86	43
176 -	131 -		9 0 0/	44
	132 -		88	
		\subseteq		
			\sim	

Software Name		Hardware I	Name
	Polarity	NI PXI-2530	NI TB-2630

Single 64x1	Dual 32x1	Quad 16x1		Connector Pin Number	Terminal Name
com0	com0	com0	+	141	Bank 0, Pin 18
			_	97	Bank 1, Pin 18
		com1	+	114	Bank 2, Pin 18
			_	159	Bank 3, Pin 18
	com1	com2	+	9	Bank 4, Pin 18
			_	53	Bank 5, Pin 18
		com3	+	70	Bank 6, Pin 18
			_	27	Bank 7, Pin 18
			+	150	Bank 0-1, Pin 17
			_	123	Bank 2-3, Pin 17
			+	18	Bank 4-5, Pin 17
			_	79	Bank 6-7 Pin 17
	ch0		+	133	Bank 0, Pin 1
			_	142	Bank 1, Pin 1
	ch1		+	89	Bank 0, Pin 2
			_	98	Bank 1, Pin 2

			1
ch2	+	134	Bank 0, Pin 3
	-	143	Bank 1, Pin 3
ch3	+	90	Bank 0, Pin 4
	-	99	Bank 1, Pin 4
ch4	+	135	Bank 0, Pin 5
	_	144	Bank 1, Pin 5
ch5	+	91	Bank 0, Pin 6
	_	100	Bank 1, Pin 6
ch6	+	136	Bank 0, Pin 7
	_	145	Bank 1, Pin 7
ch7	+	92	Bank 0, Pin 8
	_	101	Bank 1, Pin 8
ch8	+	137	Bank 0, Pin 9
	_	146	Bank 1, Pin 9
ch9	+	93	Bank 0, Pin 10
	-	102	Bank 1, Pin 10
ch10	+	138	Bank 0, Pin

			11
	_	147	Bank 1, Pin 11
ch11	+	94	Bank 0, Pin 12
	-	103	Bank 1, Pin 12
ch12	+	139	Bank 0, Pin 13
	-	148	Bank 1, Pin 13
ch13	+	95	Bank 0, Pin 14
	_	104	Bank 1, Pin 14
ch14	+	140	Bank 0, Pin 15
	-	149	Bank 1, Pin 15
ch15	+	96	Bank 0, Pin 16
	_	105	Bank 1, Pin 16
ch16	+	106	Bank 2, Pin 1
	_	115	Bank 3, Pin 1
ch17	+	151	Bank 2, Pin 2
	-	160	Bank 3, Pin 2
ch18	+	107	Bank 2, Pin 3

	-	116	Bank 3, Pin 3
ch19	+	152	Bank 2, Pin 4
	-	161	Bank 3, Pin 4
ch20	+	108	Bank 2, Pin 5
	-	117	Bank 3, Pin 5
ch21	+	153	Bank 2, Pin 6
	-	162	Bank 3, Pin 6
ch22	+	109	Bank 2, Pin 7
	—	118	Bank 3, Pin 7
ch23	+	154	Bank 2, Pin 8
	-	163	Bank 3, Pin 8
ch24	+	110	Bank 2, Pin 9
	—	119	Bank 3, Pin 9
ch25	+	155	Bank 2, Pin 10
	-	164	Bank 3, Pin 10
ch26	+	111	Bank 2, Pin 11
	-	120	Bank 3, Pin 11

ch27	+	156	Bank 2, Pin 12
	_	165	Bank 3, Pin 12
ch28	+	112	Bank 2, Pin 13
	_	121	Bank 3, Pin 13
ch29	+	157	Bank 2, Pin 14
	_	166	Bank 3, Pin 14
ch30	+	113	Bank 2, Pin 15
	_	122	Bank 3, Pin 15
ch31	+	158	Bank 2, Pin 16
	_	167	Bank 3, Pin 16
ch32	+	1	Bank 4, Pin 1
	_	10	Bank 5, Pin 1
ch33	+	45	Bank 4, Pin 2
	_	54	Bank 5, Pin 2
ch34	+	2	Bank 4, Pin 3
	—	11	Bank 5, Pin 3
ch35	+	46	Bank 4, Pin 4

	-	55	Bank 5, Pin 4
ch36	+	3	Bank 4, Pin 5
	-	12	Bank 5, Pin 5
ch37	+	47	Bank 4, Pin 6
	-	56	Bank 5, Pin 6
ch38	+	4	Bank 4, Pin 7
	-	13	Bank 5, Pin 7
ch39	+	48	Bank 4, Pin 8
	-	57	Bank 5, Pin 8
ch40	+	5	Bank 4, Pin 9
	-	14	Bank 5, Pin 9
ch41	+	49	Bank 4, Pin 10
	-	58	Bank 5, Pin 10
ch42	+	6	Bank 4, Pin 11
	-	15	Bank 5, Pin 11
ch43	+	50	Bank 4, Pin 12
	-	59	Bank 5, Pin 12

ch44	+	7	Bank 4, Pin 13
	-	16	Bank 5, Pin 13
ch45	+	51	Bank 4, Pin 14
	_	60	Bank 5, Pin 14
ch46	+	8	Bank 4, Pin 15
	_	17	Bank 5, Pin 15
ch47	+	52	Bank 4, Pin 16
	_	61	Bank 5, Pin 16
ch48	+	62	Bank 6, Pin 1
	_	71	Bank 7, Pin 1
ch49	+	19	Bank 6, Pin 2
	_	28	Bank 7, Pin 2
ch50	+	63	Bank 6, Pin 3
	_	72	Bank 7, Pin 3
ch51	+	20	Bank 6, Pin 4
	-	29	Bank 7, Pin 4
ch52	+	64	Bank 6, Pin 5

	-	73	Bank 7, Pin 5
ch53	+	21	Bank 6, Pin 6
	-	30	Bank 7, Pin 6
ch54	+	65	Bank 6, Pin 7
	—	74	Bank 7, Pin 7
ch55	+	22	Bank 6, Pin 8
	_	31	Bank 7, Pin 8
ch56	+	66	Bank 6, Pin 9
	_	75	Bank 7, Pin 9
ch57	+	23	Bank 6, Pin 10
	_	32	Bank 7, Pin 10
ch58	+	67	Bank 6, Pin 11
	_	76	Bank 7, Pin 11
ch59	+	24	Bank 6, Pin 12
	-	33	Bank 7, Pin 12
ch60	+	68	Bank 6, Pin 13
	-	77	Bank 7, Pin 13

ch61	+	25	Bank 6, Pin 14
		34	Bank 7, Pin 14
ch62	+	69	Bank 6, Pin 15
	_	78	Bank 7, Pin 15
ch63	+	26	Bank 6, Pin 16
	—	35	Bank 7, Pin 16
-			

NI PXI-2530 4-Wire Multiplexer Topologies

The following figure and table identify the pins for the NI PXI-2530 in the 4-wire multiplexer topologies.

			_	_	\neg		
133 -		f	ĵ	Ĺ	o	15	1
134 -	89 -	•	ľ	ŕ	0	- 45	2
135 -	90 -	-	j	Ľ	0-	- 46	3
136	91 -	-	ľ	Ľ	0	- 47	4
137 -	92 -	-	j	ŕ	0	- 48	5
138 -	93 -	•	ľ	ŕ	0	- 49	6
139 -	94 -	-	j	Ľ	0	- 50	7
140 -	95 -	•	Ľ	Ľ	0	- 51	8
141 -	96 -	5	ļ	Ľ	0	- 52	9
142 -	97 -	•	ļ	Ľ	0	- 53	10
143 -	98 -	-	ľ	Ľ	0	- 54	11
144 -	99 -	-	_	Ľ	0-	- 55	12
145 -	100 -	-	Ľ	Ľ	0-	- 56	13
146 -	101 -	-		_	0-	- 57	14
147	102 -		Ĵ	Ĺ	-	- 58	15
148 -	103 -	-	Ľ	Ĺ	0	- 59	16
149	104 -	L.	Ĵ	Ĺ	-	- 60	17
150 -	105 -	+	Ĵ	Ĺ	_	- 61	
	106 -	1°	Ĵ	Ĺ	0	- 62	18
151 -	107 -	•	Ĵ	Ĺ		- 63	19
152 -	108 -	°.	Ĵ	Ĺ	0-	- 64	20
153 -	109 -	10	Ĵ	Ĺ	0	- 65	21
154 -	110 -	°.	Ĵ	Ľ	0-	- 66	22
155 -	111 -	•	ľ	Ľ	0	- 67	23
156 -	112 -	•	Ĵ	Ľ	0	- 68	24
157 -	113 -	•	ĵ	Ĺ	0-	- 69	25
158 -	114 -	<u>•</u>	Ĵ	Ĺ	0-	- 70	26
159 -	115 -	•	ĵ	Ĺ	0-	- 71	27
160 ·	116 -	•	ĵ	Ĺ	0-		28
161 -		•	ĵ	Ĉ	0-	- 72	29
162 -	117 -	-	ĵ	Ĺ	0-	- 73	30
163 -	118 -	-	ĵ	Ĺ	0-	- 74	31
164 -	119 -	-0	ĵ	ŕ	0	- 75	32
165 -	120 -	•	j	Ľ	0-	- 76	33
166 -	121 -	•	ľ	Ľ	0-	- 77	34
167 -	122 -	•	j	ŕ	0	- 78	35
168 -	123 -	-	_	Ľ	0-	- 79	36
169 -	124 -	-	ľ	Ľ	0	- 80	37
170	125 -	-	ľ	Ľ	0-	- 81	38
171 -	126 -	-	ļ	Ľ	D	- 82	39
172 -	127 -	-			0-	- 83	40
173 -	128 -		Ĵ	Ĺ	0	- 84	41
174	129 -	-	ľ	Ĺ	-	- 85	42
175 -	130 -	F.	ļ	Ĺ	0	- 86	43
176 -	131 -	Ŀ	Ĺ	Ĺ		- 87	
1/0 -	132 -	F	Ĵ	Ĺ	0-	- 88	44
		l					
			_	_			

Software Name		Hardware Name	
	Polarity	NI PXI-2530	NI TB-2630

Single 32x1	Dual 16x1		Connector Pin Number	Terminal Name
com0	com0	A+	141	Bank 0, Pin 18
		A-	97	Bank 1, Pin 18
		B+	9	Bank 4, Pin 18
		B-	53	Bank 5, Pin 18
	com1	A+	114	Bank 2, Pin 18
		A-	159	Bank 3, Pin 18
		B+	70	Bank 6, Pin 18
		B-	27	Bank 7, Pin 18
			150	Bank 0-1, Pin 17
			123	Bank 2-3, Pin 17
			18	Bank 4-5, Pin 17
			79	Bank 6-7 Pin 17
ch	0	A+	133	Bank 0, Pin 1
		A-	142	Bank 1, Pin 1
		B+	1	Bank 4, Pin 1
		B-	10	Bank 5, Pin 1
ch	1	A+	89	Bank 0, Pin 2
		A-	96	Bank 1, Pin 2
		B+	45	Bank 4, Pin 2
		B-	54	Bank 5, Pin 2
ch	2	A+	134	Bank 0, Pin 3
		A-	143	Bank 1, Pin 3
		B+	2	Bank 4, Pin 3
		B-	11	Bank 5, Pin 3
ch	3	A+	90	Bank 0, Pin 4

	A-	99	Bank 1, Pin 4
	B+	46	Bank 4, Pin 4
	B-	55	Bank 5, Pin 4
ch4	A+	135	Bank 0, Pin 5
	A-	144	Bank 1, Pin 5
	B+	3	Bank 4, Pin 5
	B-	12	Bank 5, Pin 5
ch5	A+	91	Bank 0, Pin 6
	A-	100	Bank 1, Pin 6
	B+	47	Bank 4, Pin 6
	B-	56	Bank 5, Pin 6
ch6	A+	136	Bank 0, Pin 7
	A-	145	Bank 1, Pin 7
	B+	4	Bank 4, Pin 7
	B-	13	Bank 5, Pin 7
ch7	A+	92	Bank 0, Pin 8
	A-	101	Bank 1, Pin 8
	B+	48	Bank 4, Pin 8
	B-	57	Bank 5, Pin 8
ch8	A+	137	Bank 0, Pin 9
	A-	146	Bank 1, Pin 9
	B+	5	Bank 4, Pin 9
	B-	14	Bank 5, Pin 9
ch9	A+	93	Bank 0, Pin 10
	A-	102	Bank 1, Pin 10
	B+	49	Bank 4, Pin 10
	B-	58	Bank 5, Pin 10
ch10	A+	138	Bank 0, Pin 11
	A-	147	Bank 1, Pin 11

	B+	6	Bank 4, Pin 11
	В-	15	Bank 5, Pin 11
ch11	A+	94	Bank 0, Pin 12
	A-	103	Bank 1, Pin 12
	B+	50	Bank 4, Pin 12
	B-	59	Bank 5, Pin 12
ch12	A+	139	Bank 0, Pin 13
	A-	148	Bank 1, Pin 13
	B+	7	Bank 4, Pin 13
	B-	16	Bank 5, Pin 13
ch13	A+	95	Bank 0, Pin 14
	A-	104	Bank 1, Pin 14
	B+	51	Bank 4, Pin 14
	B-	60	Bank 5, Pin 14
ch14	A+	140	Bank 0, Pin 15
	A-	149	Bank 1, Pin 15
	B+	8	Bank 4, Pin 15
	B-	17	Bank 5, Pin 15
ch15	A+	96	Bank 0, Pin 16
	A-	105	Bank 1, Pin 16
	B+	52	Bank 4, Pin 16
	B-	61	Bank 5, Pin 16
ch16	A+	106	Bank 2, Pin 1
	A-	115	Bank 3, Pin 1
	B+	62	Bank 6, Pin 1
	B-	71	Bank 7, Pin 1
ch17	A+	151	Bank 2, Pin 2
	A-	160	Bank 3, Pin 2
	B+	19	Bank 6, Pin 2

	B-	28	Bank 7, Pin 2
ch18	A+	107	Bank 2, Pin 3
	A-	116	Bank 3, Pin 3
	B+	63	Bank 6, Pin 3
	B-	72	Bank 7, Pin 3
ch19	A+	152	Bank 2, Pin 4
	A-	161	Bank 3, Pin 4
	B+	20	Bank 6, Pin 4
	B-	29	Bank 7, Pin 4
ch20	A+	108	Bank 2, Pin 5
	A-	117	Bank 3, Pin 5
	B+	64	Bank 6, Pin 5
	B-	73	Bank 7, Pin 5
ch21	A+	153	Bank 2, Pin 6
	A-	162	Bank 3, Pin 6
	B+	21	Bank 6, Pin 6
	B-	30	Bank 7, Pin 6
ch22	A+	109	Bank 2, Pin 7
	A-	118	Bank 3, Pin 7
	B+	65	Bank 6, Pin 7
	B-	74	Bank 7, Pin 7
ch23	A+	154	Bank 2, Pin 8
	A-	163	Bank 3, Pin 8
	B+	22	Bank 6, Pin 8
	B-	31	Bank 7, Pin 8
ch24	A+	110	Bank 2, Pin 9
	A-	119	Bank 3, Pin 9
	B+	66	Bank 6, Pin 9
	B-	75	Bank 7, Pin 9

ch25	A+	155	Bank 2, Pin 10
	A-	164	Bank 3, Pin 10
	B+	23	Bank 6, Pin 10
	B-	32	Bank 7, Pin 10
ch26	A+	111	Bank 2, Pin 11
	A-	120	Bank 3, Pin 11
	B+	67	Bank 6, Pin 11
	B-	76	Bank 7, Pin 11
ch27	A+	156	Bank 2, Pin 12
	A-	165	Bank 3, Pin 12
	B+	24	Bank 6, Pin 12
	B-	33	Bank 7, Pin 12
ch28	A+	112	Bank 2, Pin 13
	A-	121	Bank 3, Pin 13
	B+	68	Bank 6, Pin 13
	B-	77	Bank 7, Pin 13
ch29	A+	157	Bank 2, Pin 14
	A-	166	Bank 3, Pin 14
	B+	25	Bank 6, Pin 14
	B-	34	Bank 7, Pin 14
ch30	A+	113	Bank 2, Pin 15
	A-	122	Bank 3, Pin 15
	B+	69	Bank 6, Pin 15
	B-	78	Bank 7, Pin 15
ch31	A+	158	Bank 2, Pin 16
	A-	167	Bank 3, Pin 16
	B+	26	Bank 6, Pin 16
	B-	35	Bank 7, Pin 16

NI PXI-2530 1-Wire 4x32 Matrix Topology

The following figure and table identify the pins for the NI PXI-2530 in the 1-wire 4x32 matrix topology.

	_	_	_	7		
133 -		ĵ	f	-		- 1
134 -	89	ľ	ŕ	0	- 45	2
135 -	90	_	ŕ	~	- 46	- 3
136	91		ŕ	~	- 47	4
137 -	92	_	Ľ	0	- 48	5
138 -	93				- 49	6
139 -	94		Ĺ	0	- 50	- 7
140 -	95 +		Ĺ	0	- 51	8
141 -	96		Ĺ	•	- 52	. 9
142 -	97		Ĺ	\rightarrow	- 53	
142 -	98		Ĺ	•	- 54	• 10
	99	î	Ĺ	•	- 55	- 11
144 -	100		Ľ	^	- 56	12
145 -	101	Ĵ	Ľ	•	- 57	13
146 -	102		Ľ	•	- 58	- 14
147 ·	103	ĵ	Ĺ	•	- 59	15
148 -	104	ĵ	Ĺ	P	- 60	16
149 -	104	Ĵ	Ľ	•	- 61	17
150 -		Ĵ	Ĺ	D-		- 18
151 -	106	ĵ	Ĺ	•	- 62	19
152 -	107	ĵ	Ĺ	0	- 63	- 20
153 -	108	ľ	Ľ	0	- 64	21
154 -	109		È	~	- 65	- 22
155 -	110		È	0	- 66	23
156 -	111		Ľ	•	- 67	24
157 -	112		Ľ	0	- 68	- 25
158 -	113		Ľ	-	- 69	26
159 -	114		_	0	- 70	- 27
160	115		Ĺ	-	- 71	- 28
161 -	116		Ĺ	0	- 72	- 29
162 -	117	Ľ	Ĺ	-	- 73	- 30
163 -	118 +		Ĺ	-	- 74	
	119		Ĺ	-	- 75	- 31
164 -	120	ſ	Ĺ	•	- 76	32
165 -	121	î	Ĺ	•	- 77	33
166 -	122	Ĵ	Ľ	•	- 78	34
167 -	123	Ĵ	Ĺ	•	- 79	- 35
168 -	124		Ľ	•	- 80	- 36
169 -	125	Ĵ	Ĺ	0	- 81	37
170 ·		Ĵ	Ĺ	•	- 82	38
171 -	126	Ľ	Ľ	•		- 39
172 -	127	Ĵ	Ĺ	•	- 83	40
173 -	128		ŕ	•	- 84	41
174 ·	129		Ľ	•	- 85	42
175 -	130		Ľ	•	- 86	43
176 -	131		È	•	- 87	44
	132	_	-	1	- 88	
		_	_			

Hardware Name				
Software Name	NI PXI-2530	NI TB-2631		

	Connector Pin Number	Terminal Name
rO	141	ROW 0
r1	114	ROW 2
r2	9	ROW 4
r3	70	ROW 6
c0	1, 62, 106, 133	COLUMN 0
c1	45, 19, 151, 89	COLUMN 1
c2	2, 63, 107, 134	COLUMN 2
c3	46, 20, 152, 90	COLUMN 3
c4	3, 64, 108, 135	COLUMN 4
c5	47, 21, 153, 91	COLUMN 5
c6	4, 65, 109, 136	COLUMN 6
c7	48, 22, 154, 92	COLUMN 7
c8	5, 66, 110, 137	COLUMN 8
c9	49, 23, 155, 93	COLUMN 9
c10	6, 67, 111, 138	COLUMN 10
c11	50, 24, 156, 94	COLUMN 11
c12	7, 68, 112, 139	COLUMN 12
c13	51, 25, 157, 95	COLUMN 13
c14	8, 69, 113, 140	COLUMN 14
c15	52, 26, 158, 96	COLUMN 15
c16	10, 71, 115, 142	COLUMN 16
c17	54, 28, 160, 98	COLUMN 17
c18	11, 72, 116, 143	COLUMN 18
c19	55, 29, 161, 99	COLUMN 19
c20	12, 73, 117, 144	COLUMN 20
c21	56, 30, 162, 100	COLUMN 21
c22	13, 74, 118, 145	COLUMN 22
c23	57, 31, 163, 101	COLUMN 23
c24	14, 75, 119, 146	COLUMN 24

c25	58, 32, 164, 102	COLUMN 25
c26	15, 76, 120, 147	COLUMN 26
c27	59, 33, 165, 103	COLUMN 27
c28	16, 77, 121, 148	COLUMN 28
c29	60, 34, 166, 104	COLUMN 29
c30	17, 78, 122, 149	COLUMN 30
c31	61, 35, 167, 105	COLUMN 31
	•	-

NI PXI-2530 1-Wire 8x16 Matrix Topology

The following figure and table identify the pins for the NI PXI-2530 in the 1-wire 8x16 matrix topology.

		_)	
133 -		f• i	٩		- 1
134 -	89 -	•	ľ	- 45	- 2
135 -	90 -		60	- 46	- 3
136	91 -		Ľ	47	4
137 -	92 -	-	20	- 48	- 5
138	93 -		Ľ	49	- 6
139 -	94 -		20	- 50	7
140 -	95 -			- 51	- 8
141 -	96 -		و ہ و	- 52	- 9
142 -	97 -			- 53	- 10
143 -	98 -			- 54	- 11
144 -	99 -	+		- 55	12
145 -	100 -			- 56	- 13
146	101 -	-		- 57	- 14
147	102 -	-		- 58	- 15
148 -	103 -	2	<u> </u>	- 59	- 16
	104 -		2	60	
149	105 -		<u> </u>	61	17
150 -	106 -		Ľ	- 62	- 18
151 -	107 -	<u>°</u>	Ľ	- 63	- 19
152 -	108 -	2	Ľ	64	- 20
153 -	109 -	Ľ	ိုင	- 65	- 21
154 -	110 -	te i	Ľ	66	- 22
155 -	111 -	Ľ	Ľ	67	- 23
156 -	112 -	<u>°</u>	്ര	- 68	- 24
157 -	113 -	Ľ	Ľ	- 69	- 25
158 -	114 -	2	്	70	- 26
159 -	115 -	2	ိုင်္	71	- 27
160	116 -	2	്	72	- 28
161 -	117 -	e i	٢Þ	73	- 29
162 ·	118 -	<u>°</u>	്ര	74	- 30
163 ·	119 -	<u>•</u> •	٢	- 75	- 31
164 -		lo g	ိုဇ		- 32
165 -	120 -	• •	e o	76	- 33
166 -	121 -	- °	و ہ	77	- 34
167 -	122 -	- 9	و ہ	- 78	- 35
168 -	123 -	-	2	- 79	- 36
169 -	124 -	- 9	20	- 80	37
170	125 -	- 1	20	81	38
171 -	126 -		9 0	82	- 39
172 -	127 -	•	2	83	- 40
173 ·	128 -	•	6	- 84	41
174	129 -	-	20	85	42
175 -	130 -		٢	- 86	43
176 -	131 -		20	87	- 44
	132 -	Γ'		- 88	-
		\subseteq		J	

	Hardware Name	
Software Name	NI PXI-2530	NI TB-2632

	Connector Pin Number	Terminal Name
rO	141	ROW 0
r1	97	ROW 1
r2	114	ROW 2
r3	159	ROW 3
r4	9	ROW 4
r5	53	ROW 5
r6	70	ROW 6
r7	27	ROW 7
c0	1, 62, 106, 133, 5, 66, 110, 137	COLUMN 0
c1	45, 19, 151, 89, 54, 28, 160, 98	COLUMN 1
c2	2, 63, 107, 134, 11, 72, 116, 143	COLUMN 2
c3	46, 20, 152, 90, 55, 29, 161, 99	COLUMN 3
c4	3, 64, 108, 135, 12, 73, 117, 144	COLUMN 4
c5	47, 21, 153, 91, 56, 30, 162, 100	COLUMN 5
c6	4, 65, 109, 136, 13, 74, 118, 145	COLUMN 6
c7	48, 22, 154, 92, 57, 31, 163, 101	COLUMN 7
c8	5, 66, 110, 137, 14, 75, 119, 146	COLUMN 8
c9	49, 23, 155, 93, 58, 32, 164, 102	COLUMN 9
c10	6, 67, 111, 138, 15, 76, 120, 147	COLUMN 10
c11	50, 24, 156, 94, 59, 33, 165, 103	COLUMN 11
c12	7, 68, 112, 139, 16, 77, 121, 148	COLUMN 12
c13	51, 25, 157, 95, 60, 34, 166, 104	COLUMN 13
c14	8, 69, 113, 140, 17, 78, 122, 149	COLUMN 14
c15	52, 26, 158, 96, 61, 35, 167, 105	COLUMN 15

NI PXI-2530 2-Wire 4x16 Matrix Topology

The following figure and table identify the pins for the NI PXI-2530 in the 2-wire 4x16 matrix topology.

			\sim)	
133 -		f• i	e م		- 1
134 -	89 -		20-	- 45	- 2
135 -	90 -	• •	6 -	- 46	- 3
136	91 -		L و م	- 47	- 4
137 -	92 -		20-	- 48	- 5
138 -	93 -			- 49	- 6
139	94 -	+		- 50	- 7
140 -	95 -	-		- 51	- 8
141 -	96 -	+		- 52	- 9
142 -	97 -	-		- 53	- 10
143 -	98 -	+		- 54	- 11
144 -	99 -		<u> </u>	- 55	- 12
	100 -		<u> </u>	- 56	
145 -	101 -		2	- 57	- 13
146 -	102 -	p_1	Ľ	- 58	- 14
147 ·	103 -	<u>†</u>	լ-	- 59	- 15
148 -	104 -	to 1	٢	- 60	- 16
149	105 -	t° '	Ľ	- 61	- 17
150 -	106 -	Þ	Ľ	- 62	- 18
151 -	107 -	2	Ľ	- 63	- 19
152 -	108 -	<u>•</u>	ę ۰	- 64	- 20
153 -	109 -	<u>•</u>	٢	- 65	- 21
154 -		<u>•</u>	۲œ		- 22
155 -	110 -	- °	ę ۰	- 66 - 67	- 23
156 -	111 -	- 7	2 -		- 24
157 -	112 -		<u>و</u> م	- 68	- 25
158 -	113 -		20-	- 69	- 26
159 -	114 -	- 9	20-	- 70	- 27
160 ·	115 -		20-	- 71	- 28
161 -	116 -		20	- 72	- 29
162 -	117 -	-	2	- 73	- 30
163 -	118 -	•	20-	- 74	- 31
164 -	119 -		20-	- 75	- 32
165 -	120 -		20-	- 76	- 33
166 -	121 -		L و م	- 77	- 34
167 -	122 -		۲ ۲	- 78	- 35
168 -	123 -			- 79	- 36
169 -	124 -	-		- 80	- 37
170	125 -	-		- 81	- 38
171 -	126 -	+		82	- 39
	127 -	-		- 83	
172 -	128 -	te i	<u> </u>	- 84	- 40
173 -	129 -		<u> </u>	- 85	- 41
174	130 -			- 86	- 42
175 -	131 -		<u> </u>	- 87	- 43
176 -	132 -	2	്	- 88	- 44
		\leq	\sim	J	

	Hardware Name			
Software Name Polarity	NI PXI-2530	NI TB-2631		

		Connector Pin Number	Terminal Name
rO	+	141	ROW 0
	_	97	ROW 1
r1	+	114	ROW 2
	_	159	ROW 3
r2	+	9	ROW 4
	_	53	ROW 5
r3	+	70	ROW 6
	_	27	ROW 7
c0	+	1, 62, 106, 133	COLUMN 0
	_	45, 19, 151, 89	COLUMN 16
c1	+	2, 63, 107, 134	COLUMN 1
	_	46, 20, 152, 90	COLUMN 17
c2	+	3, 64, 108, 135	COLUMN 2
	_	47, 21, 153, 91	COLUMN 18
c3	+	4, 65, 109, 136	COLUMN 3
	_	48, 22,154, 92	COLUMN 19
c4	+	5, 66, 110, 137	COLUMN 4
	_	49, 23, 155, 93	COLUMN 20
c5	+	6, 67, 111, 138	COLUMN 5
	_	50, 24, 156, 94	COLUMN 21
c6	+	7, 68, 112, 139	COLUMN 6
	_	51, 25, 157, 95	COLUMN 22
c7	+	8, 69, 113, 140	COLUMN 7
	_	52, 26, 158, 96	COLUMN 23
c8	+	10, 71, 115, 142	COLUMN 8
	_	54, 28, 160, 98	COLUMN 24
c9	+	11, 72, 116, 143	COLUMN 9
	_	55, 29, 161, 99	COLUMN 25
c10	+	12, 73, 117, 144	COLUMN 10

	_	56, 30, 162, 100	COLUMN 26
c11	+	13, 74, 118, 145	COLUMN 11
	—	57, 31, 163, 101	COLUMN 27
c12	+	14, 75, 119, 146	COLUMN 12
	—	58, 32, 164, 102	COLUMN 28
c13	+	15, 76, 120, 147	COLUMN 13
	—	59, 33, 165, 103	COLUMN 29
c14	+	16, 77, 121, 148	COLUMN 14
	—	60, 34, 166, 104	COLUMN 30
c15	+	17, 78, 122, 149	COLUMN 15
	_	61, 35, 167, 105	COLUMN 31

NI PXI-2530 Triggering

The NI PXI-2530 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2530.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG IN on NI terminal block

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2530.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG OUT on NI terminal block

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2530 Relay Replacement

The NI PXI-2530 uses reed relays.

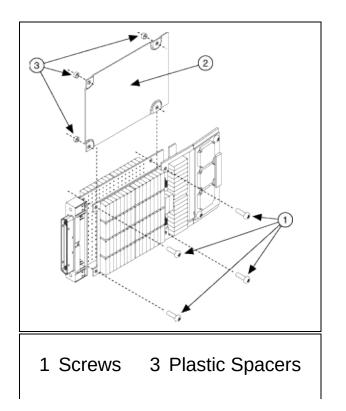
Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part						
Meder	MS05-1A71-75DHR						

Complete the following sets of steps to disassemble your switch module, replace a failed relay, and reassemble your switch module.

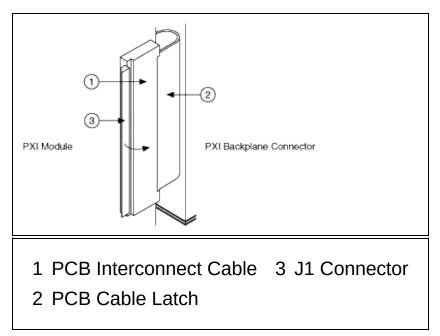
Disassemble the Switch Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your switch module from electrostatic discharge.
- 2. Remove the four screws that secure the top and bottom daughterboards to the switch assembly.
- 3. Remove the insulator and the plastic spacers that separate the daughterboards.

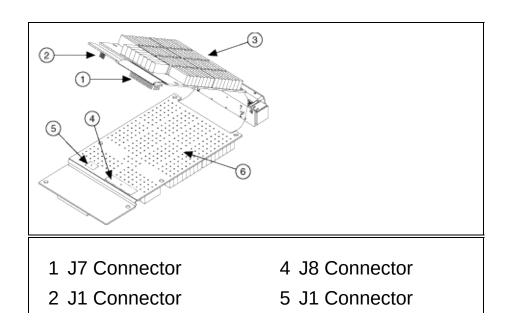


2 Insulator

4. To access the daughterboards, disconnect the PCB interconnect cable by lifting the PCB cable latch on the J1 connector.



5. Carefully disconnect connectors J7 and J1 on the bottom daughterboard from connectors J8 and J1, respectively, on the top daughterboard.



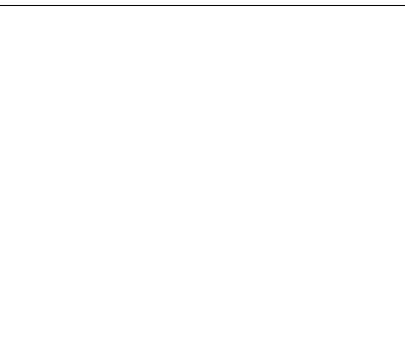
3 Bottom Daughterboard 6 Top Daughterboard

6. Refer to the following figures to locate the relay you want to replace.

Top Daughterboard

									_										1				
																			KBC04				
	4	6	9	~	8	0	0	_	2	5	4	ß	9	~	œ	6			SPARE				
	CH64	CH65	CH66	CH67	CH68	CH69	CH70	CH7	CH72	CH73	CH74	CH75	CH76	CH77	CH78	CH79			SPARE				
																			KBC45				
																			KCOM5				
										KBC46													
	0	-	~		4	ۍ ا	g	~	8	6	0	-	~		4	ц			SPARE				
FRONT CONNECTOR	CH80	CH81	CH82	CH83	CH84	CH85	CH86	CH87	CH88	CH89	CH90	CH91	CH92	CH93	쭝	CH94 CH95	풍 풍	CH95	홍 홍	쭝 쭝		\square	KREF45
EC.																							
N N																	SPARE	SPARE					
ŏ																	SP	l gg					
-S	-	0	æ	8	5	ω	ŝ	4	0	2	-	0	6		2								
E	CH111	CH110	CH109	CH108	CH107	CH106	CH105	CH104	CH103	CH102	CH101	CH100	CH99	CH98	CH97	CH96			KBC15				
	ō	ō	ō	σ	ō	ō	õ	ō	ō	Ö	ō	õ	0	0	0	0			KBC57				
																			SPARE				
										T					I				SPARE				
																			KBC67				
	CH127	CH126	CH125	CH124	CH123	CH122	CH121	CH120	CH119	CH118	CH117	CH116	CH115	CH114	CH113	CH112			SPARE				
	1 J	٦.	ų	ų	۲.	5	£	친	Ð	Ð	£	5 5 5 5 5 5		ų			KREF67						
																			KCOM7				
										-			-	-									

Bottom Daughterboard



	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CHB	212	ÈD)	CH6	CH5	CH4	CH3	CH2	CH1	CHO		
KBC01 KCOM1 KREF01 KBC13	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24		CHZ3	CH22	CH21	CH20	CH19	CH18	CH17	CH16	FRONT CONNECTOR	
KBC02 KBC23 KCOM3 KREF23	CH32	CH33	CH34	CH35	CH36	CH37	CH38	CH39		CH40	CH41	CH42	CH43	CH44	CH45	CH46	CH47	FRONT CC	
	CH48	CH49	CH50	CH51	CH52	CH53	CH54	CH55		0000	CH57	CH58	CH59	CH60	CH61	CH62	CH63		

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Isopropyl alcohol
- Cotton swabs

Replace the relay as you would any other through-hole part.

Reassemble the Switch Module

Complete the <u>Disassemble the Switch Module</u> steps in reverse order to reassemble your switch module.

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2532

The NI PXI-2532 is a 512-crosspoint, high-density <u>matrix</u> switch module for the PXI platform. The NI PXI-2532 is designed for switching high and low voltages.

Operation Modes

The following table lists the supported topologies of the NI PXI-2532 and possible <u>operation modes</u>.

Topology	Software Name
<u>1-Wire</u> <u>4×128</u> <u>Matrix</u>	2532/1-Wire 4x128 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_4X128_MATRIX)
<u>1-Wire</u> <u>8×64</u> <u>Matrix</u>	2532/1-Wire 8x64 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_8X64_MATRIX)
<u>1-Wire</u> <u>16×32</u> <u>Matrix</u>	2532/1-Wire 16x32 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_16X32_MATRIX)
<u>1-Wire</u> Dual <u>4×64</u> Matrix	2532/1-Wire Dual 4x64 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_DUAL_4X64_MATH
<u>1-Wire</u> Dual <u>8×32</u> Matrix	2532/1-Wire Dual 8x32 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_DUAL_8X32_MATI
<u>1-Wire</u> Dual <u>16×16</u> Matrix	2532/1-Wire Dual 16x16 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_DUAL_16X16_MA ⁻
<u>1-Wire</u> <u>Sixteen</u> <u>2×16</u> <u>Matrix</u>	2532/1-Wire Sixteen 2x16 Matrix (NISWITCH_TOPOLOGY_2532_1_WIRE_SIXTEEN_2X16_N
<u>2-Wire</u> <u>4×64</u> <u>Matrix</u>	2532/2-Wire 4x64 Matrix (NISWITCH_TOPOLOGY_2532_2_WIRE_4X64_MATRIX)
<u>2-Wire</u> <u>8×32</u>	2532/2-Wire 8x32 Matrix (NISWITCH_TOPOLOGY_2532_2_WIRE_8X32_MATRIX)

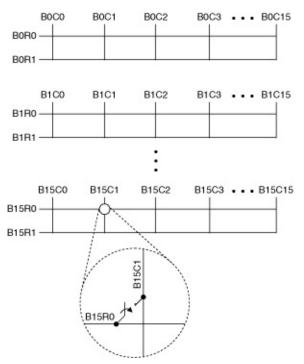
<u>Matrix</u>	
	2532/2-Wire 16x16 Matrix (NISWITCH_TOPOLOGY_2532_2_WIRE_16X16_MATRIX)

NI PXI-2532 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2532.



Note Hardware relay names are for the native 1-wire sixteen 2×16 matrix topology.

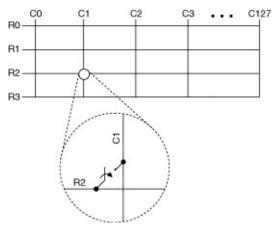


The following table lists relay names for the NI PXI-2532.

Bank 0 Relays	Bank 1 Relays	 Bank 15 Relays
kB0R0C0kB0R0C15	kB1R0C0kB1R0C15	 kB15R0C0kB15R0C
kB0R1C0kB0R1C15	kB1R1C0kB1R1C15	 kB15R1C0kB15R1C

NI PXI-2532 1-Wire 4×128 Matrix Topology

The <u>NI TB-2640</u> terminal block creates a <u>1-wire</u> 4×128 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 1-wire 4×128 matrix topology.



Making a Connection

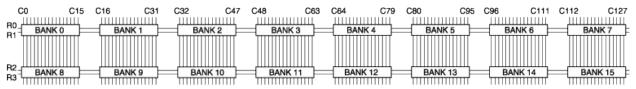
Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

signal connected to R2 is routed to C1

Terminal Block Connections

The NI TB-2640 terminal block connects banks of the NI PXI-2532 to create the 1-wire 4×128 matrix topology. The following figure illustrates how the native banks of the NI PXI-2532 connect using the NI TB-2640 to create the 1-wire 4×128 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2640 upper and lower column connection boards.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C127	J3 Pin 9	C119	J3 Pin 17	C111	J3 Pin 25	C103
J3 Pin 2	C126	J3 Pin 10	C118	J3 Pin 18	C110	J3 Pin 26	C102
J3 Pin 3	C125	J3 Pin 11	C117	J3 Pin 19	C109	J3 Pin 27	C101
J3 Pin 4	C124	J3 Pin 12	C116	J3 Pin 20	C108	J3 Pin 28	C100
J3 Pin 5	C123	J3 Pin 13	C115	J3 Pin 21	C107	J3 Pin 29	C99
J3 Pin 6	C122	J3 Pin 14	C114	J3 Pin 22	C106	J3 Pin 30	C98
J3 Pin 7	C121	J3 Pin 15	C113	J3 Pin 23	C105	J3 Pin 31	C97
J3 Pin 8	C120	J3 Pin 16	C112	J3 Pin 24	C104	J3 Pin 32	C96
Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr

Upper Column Connection Board Column Pin Assignment

J2 Pin 1	C95	J2 Pin 9	C87	J2 Pin 17	C79	J2 Pin 25	C71
J2 Pin 2	C94	J2 Pin 10	C86	J2 Pin 18	C78	J2 Pin 26	C70
J2 Pin 3	C93	J2 Pin 11	C85	J2 Pin 19	C77	J2 Pin 27	C69
J2 Pin 4	C92	J2 Pin 12	C84	J2 Pin 20	C76	J2 Pin 28	C68
J2 Pin 5	C91	J2 Pin 13	C83	J2 Pin 21	C75	J2 Pin 29	C67
J2 Pin 6	C90	J2 Pin 14	C82	J2 Pin 22	C74	J2 Pin 30	C66
J2 Pin 7	C89	J2 Pin 15	C81	J2 Pin 23	C73	J2 Pin 31	C65
J2 Pin 8	C88	J2 Pin 16	C80	J2 Pin 24	C72	J2 Pin 32	C64

Lower Column Connection Board Column Pin Assignment

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C0	J3 Pin 9	C8	J3 Pin 17	C16	J3 Pin 25	C24
J3 Pin 2	C1	J3 Pin 10	C9	J3 Pin 18	C17	J3 Pin 26	C25
J3 Pin 3	C2	J3 Pin 11	C10	J3 Pin 19	C18	J3 Pin 27	C26
J3 Pin 4	C3	J3 Pin 12	C11	J3 Pin 20	C19	J3 Pin 28	C27
J3 Pin 5	C4	J3 Pin 13	C12	J3 Pin 21	C20	J3 Pin 29	C28
J3 Pin 6	C5	J3 Pin 14	C13	J3 Pin 22	C21	J3 Pin 30	C29
J3 Pin 7	C6	J3 Pin 15	C14	J3 Pin 23	C22	J3 Pin 31	C30

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J3 Pin 8	C7	J3 Pin	C15	J3 Pin	C23	J3 Pin	C31
		16		24		32	
Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	C32	J2 Pin 9	C40	J2 Pin 17	C48	J2 Pin 25	C56
J2 Pin 2	C33	J2 Pin 10	C41	J2 Pin 18	C49	J2 Pin 26	C57
J2 Pin 3	C34	J2 Pin 11	C42	J2 Pin 19	C50	J2 Pin 27	C58
J2 Pin 4	C35	J2 Pin 12	C43	J2 Pin 20	C51	J2 Pin 28	C59
J2 Pin 5	C36	J2 Pin 13	C44	J2 Pin 21	C52	J2 Pin 29	C60
J2 Pin 6	C37	J2 Pin 14	C45	J2 Pin 22	C53	J2 Pin 30	C61
J2 Pin 7	C38	J2 Pin 15	C46	J2 Pin 23	C54	J2 Pin 31	C62
J2 Pin 8	C39	J2 Pin 16	C47	J2 Pin 24	C55	J2 Pin 32	C63

Row Pin Connections

The NI TB-2640 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

Pin Number	Row
1	RO
2	R1
3	R2
4	R3
5–16	

Row Protection Bypass Header

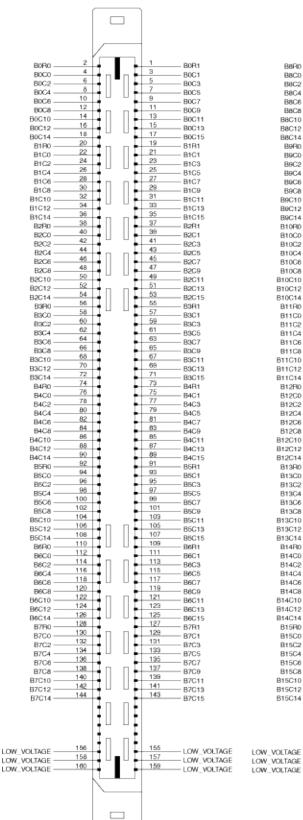
The row ribbon cable headers are isolated from the reed relays through 100 Ω resistors. To bypass these resistors, install a jumper in the appropriate position of J5 on the switch module interface board. The following table lists possible jumper locations.

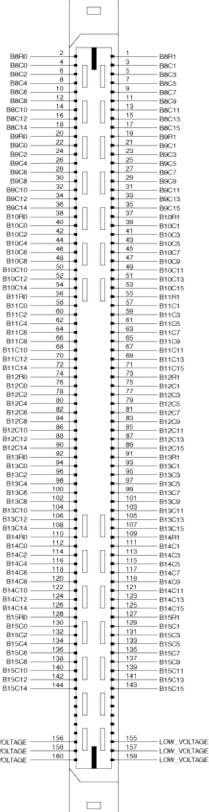
Pin Connected	Bypassed Row
1–2	R0
5–6	R1
9–10	R2
13–14	R3

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





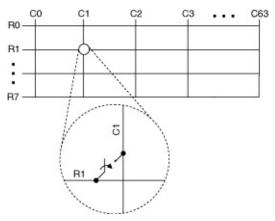
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 1-Wire 8×64 Matrix Topology

The <u>NI TB-2641</u> terminal block creates a <u>1-wire</u> 8×64 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 1-wire 8×64 matrix topology.



Making a Connection

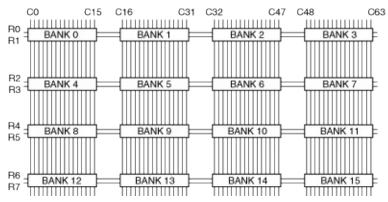
Both the scanning command, $r1 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r1 and c1, result in the following connection:

signal connected to R1 is routed to C1

Terminal Block Connections

The NI TB-2641 terminal block connects banks of the NI PXI-2532 to create the 1-wire 8×64 matrix topology. The following figure illustrates how the native banks of the NI PXI-2532 connect using the NI TB-2641 to create the 1-wire 8×64 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2641 column connection board.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C0	J3 Pin 9	C8	J3 Pin 17	C16	J3 Pin 25	C24
J3 Pin 2	C1	J3 Pin 10	C9	J3 Pin 18	C17	J3 Pin 26	C25
J3 Pin 3	C2	J3 Pin 11	C10	J3 Pin 19	C18	J3 Pin 27	C26
J3 Pin 4	C3	J3 Pin 12	C11	J3 Pin 20	C19	J3 Pin 28	C27
J3 Pin 5	C4	J3 Pin 13	C12	J3 Pin 21	C20	J3 Pin 29	C28
J3 Pin 6	C5	J3 Pin 14	C13	J3 Pin 22	C21	J3 Pin 30	C29
J3 Pin 7	C6	J3 Pin 15	C14	J3 Pin 23	C22	J3 Pin 31	C30
		1		1			

Column Connection Board Column Pin Assignment

J3 Pin 8	C7	J3 Pin	C15	J3 Pin	C23	J3 Pin	C31
		16		24		32	

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	C32	J2 Pin 9	C40	J2 Pin 17	C48	J2 Pin 25	C56
J2 Pin 2	C33	J2 Pin 10	C41	J2 Pin 18	C49	J2 Pin 26	C57
J2 Pin 3	C34	J2 Pin 11	C42	J2 Pin 19	C50	J2 Pin 27	C58
J2 Pin 4	C35	J2 Pin 12	C43	J2 Pin 20	C51	J2 Pin 28	C59
J2 Pin 5	C36	J2 Pin 13	C44	J2 Pin 21	C52	J2 Pin 29	C60
J2 Pin 6	C37	J2 Pin 14	C45	J2 Pin 22	C53	J2 Pin 30	C61
J2 Pin 7	C38	J2 Pin 15	C46	J2 Pin 23	C54	J2 Pin 31	C62
J2 Pin 8	C39	J2 Pin 16	C47	J2 Pin 24	C55	J2 Pin 32	C63

Row Pin Connections

The NI TB-2641 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

Pin Number	Row
1	RO
2	R1
3	R2
4	R3
5	R4

6	R5
7	R6
8	R7
9–16	—

Row Protection Bypass Header

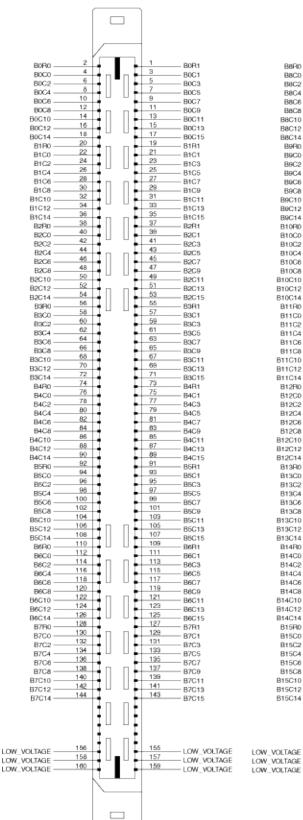
The row ribbon cable headers are isolated from the reed relays through 100 Ω resistors. To bypass these resistors, install a jumper in the appropriate position of J5 on the switch module interface board. The following table lists possible jumper locations.

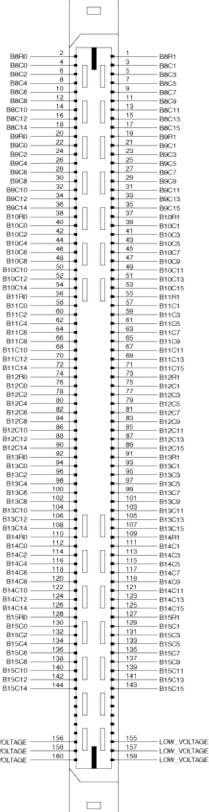
Pin Connected	Bypassed Row
1–2	R0
3–4	R1
5–6	R2
7–8	R3
9–10	R4
11–12	R5
13–14	R6
15–16	R7

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





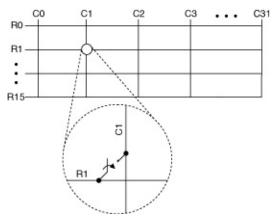
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 1-Wire 16×32 Matrix Topology

The <u>NI TB-2642</u> terminal block creates a <u>1-wire</u> 16×32 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 1-wire 16×32 matrix topology.



Making a Connection

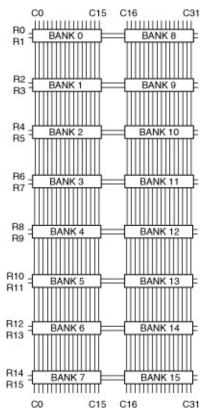
Both the scanning command, $r1 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r1 and c1, result in the following connection:

signal connected to R1 is routed to C1

Terminal Block Connections

The NI TB-2642 terminal block connects banks of the NI PXI-2532 to create the 1-wire 16×32 matrix topology. The following figure illustrates how the native banks of the NI PXI-2532 connect using the NI TB-2642 to create the 1-wire 16×32 matrix topology.

Bank Connection Diagram



The following table lists the pin assignments for the NI TB-2642 column connection board.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C0	J3 Pin 9	C8	J3 Pin 17	C16	J3 Pin 25	C24
J3 Pin 2	C1	J3 Pin 10	C9	J3 Pin 18	C17	J3 Pin 26	C25
J3 Pin 3	C2	J3 Pin 11	C10	J3 Pin 19	C18	J3 Pin 27	C26

Column Connection Board Column Pin Assignment

J3 Pin 4	C3	J3 Pin 12	C11	J3 Pin 20	C19	J3 Pin 28	C27
J3 Pin 5	C4	J3 Pin 13	C12	J3 Pin 21	C20	J3 Pin 29	C28
J3 Pin 6	C5	J3 Pin 14	C13	J3 Pin 22	C21	J3 Pin 30	C29
J3 Pin 7	C6	J3 Pin 15	C14	J3 Pin 23	C22	J3 Pin 31	C30
J3 Pin 8	C7	J3 Pin 16	C15	J3 Pin 24	C23	J3 Pin 32	C31

Note The column connection board J2 connector is *not* used in this configuration.

Row Pin Connections

The NI TB-2642 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

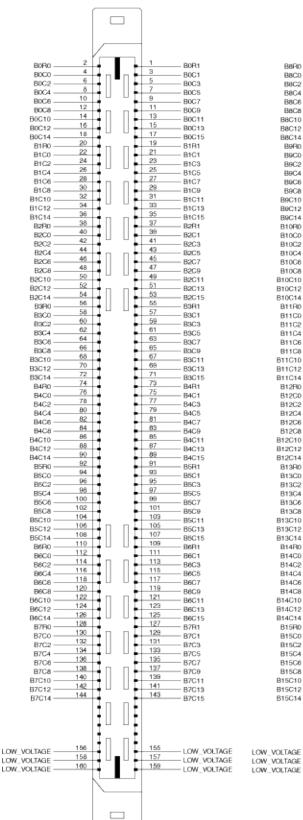
Pin Number	Row
1	RO
2	R1
3	R2
4	R3
5	R4
6	R5
7	R6
8	R7
9	R8
10	R9
11	R10
12	R11
13	R12

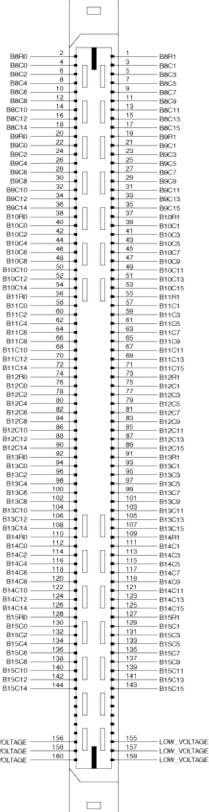
14	R13
15	R14
16	R15

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





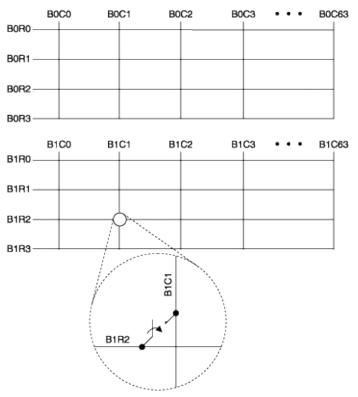
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 1-Wire Dual 4×64 Matrix Topology

The <u>NI TB-2643</u> terminal block creates a <u>1-wire</u> dual 4×64 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 1-wire dual 4×64 matrix topology.



Making a Connection

For bank 0, both the scanning command, b0r2 > b0c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters b0r2 and b0c1, result in the following connection:

signal connected to B0R2 is routed to B0C1

For bank 1, both the scanning command, b1r2 > b1c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters b1r2 and b1c1, result in the following connection:

signal connected to B1R2 is routed to B1C1

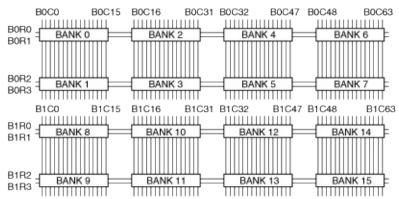


Note While you can, for example, connect B0R1 to B0C0, you cannot connect B0R1 directly to B1C1 in this topology.

Terminal Block Connections

The NI TB-2643 terminal block connects banks of the NI PXI-2532 to create the 1-wire dual 4×64 matrix topology. The following figure illustrates how the native banks of the NI PXI-2532 connect using the NI TB-2643 to create the 1-wire dual 4×64 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2643 upper and lower column connection boards.

Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
B1C63	J3 Pin 9	B1C59	J3 Pin 17	B1C55	J3 Pin 25	B1C51
B0C63	J3 Pin 10	B0C59	J3 Pin 18	B0C55	J3 Pin 26	B0C51
B1C62	J3 Pin 11	B1C58	J3 Pin 19	B1C54	J3 Pin 27	B1C50
B0C62	J3 Pin 12	B0C58	J3 Pin 20	B0C54	J3 Pin 28	B0C50
B1C61	J3 Pin 13	B1C57	J3 Pin 21	B1C53	J3 Pin 29	B1C49
B0C61	J3 Pin 14	B0C57	J3 Pin 22	B0C53	J3 Pin 30	B0C49
B1C60	J3 Pin 15	B1C56	J3 Pin 23	B1C52	J3 Pin 31	B1C48
	B1C63 B0C63 B1C62 B0C62 B1C61	ColumnNumberB1C63J3 Pin 9B0C63J3 Pin 10B1C62J3 Pin 11B0C62J3 Pin 12B1C61J3 Pin 13B0C61J3 Pin 13B0C61J3 Pin 14B1C60J3 Pin 14	Column NumberColumn ColumnB1C63J3 Pin 9B1C59B0C63J3 Pin 10B0C59B1C62J3 Pin 11B1C58B1C62J3 Pin 12B0C58B1C61J3 Pin 12B1C57B1C61J3 Pin 13B1C57B1C61J3 Pin 14B0C57B1C61J3 Pin 14B1C57B1C61J3 Pin 14B1C57B1C60J3 Pin 14B1C56	Column Number Column Number B1C63 J3 Pin 9 B1C59 J3 Pin 17 B0C63 J3 Pin 10 B0C59 J3 Pin 18 B1C62 J3 Pin 10 B1C58 J3 Pin 18 B1C62 J3 Pin 11 B1C58 J3 Pin 19 B0C62 J3 Pin 11 B0C58 J3 Pin 19 B0C62 J3 Pin 12 B0C58 J3 Pin 20 B1C61 J3 Pin 12 B1C57 J3 Pin 21 B0C61 J3 Pin 13 B1C57 J3 Pin 21 B0C61 J3 Pin 13 B1C57 J3 Pin 21 B1C60 J3 Pin 14 Z2 Z1	Column B1C63NumberColumn NumberColumn NumberColumn ColumnB1C63J3 Pin 10B1C59J3 Pin 17B1C55B0C63J3 Pin 10B0C59J3 Pin 18B0C55B1C62J3 Pin 11B1C58J3 Pin 19B1C54B0C62J3 Pin 12B0C58J3 Pin 20B0C54B1C61J3 Pin 13B1C57J3 Pin 21B1C53B0C61J3 Pin 14B0C57J3 Pin 21B0C53B1C60J3 Pin 14B1C56J3 Pin 22B1C52	Column B1C63NumberColumn NumberNumberNumberB1C63J3 Pin 9B1C59J3 Pin 17B1C55J3 Pin 25B0C63J3 Pin 10B0C59J3 Pin 18B0C55J3 Pin 26B1C62J3 Pin 10B1C58J3 Pin 19B1C54J3 Pin 27B0C62J3 Pin 11B0C58J3 Pin 20B0C54J3 Pin 28B1C61J3 Pin 12B1C57J3 Pin 20B1C53J3 Pin 29B0C61J3 Pin 13B1C57J3 Pin 21B1C53J3 Pin 29B0C61J3 Pin 14B0C57J3 Pin 22B0C53J3 Pin 30B1C60J3 Pin 14B1C56J3 Pin 22J3 Pin 30

Upper Column Connection	n Board Column	Pin Assignment
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J3 Pin 8	B0C60	J3 Pin	B0C56	J3 Pin	B0C52	J3 Pin	B0C48
		16		24		32	

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	B1C47	J2 Pin 9	B1C43	J2 Pin 17	B1C39	J2 Pin 25	B1C35
J2 Pin 2	B0C47	J2 Pin 10	B0C43	J2 Pin 18	B0C39	J2 Pin 26	B0C35
J2 Pin 3	B1C46	J2 Pin 11	B1C42	J2 Pin 19	B1C38	J2 Pin 27	B1C34
J2 Pin 4	B0C46	J2 Pin 12	B0C42	J2 Pin 20	B0C38	J2 Pin 28	B0C34
J2 Pin 5	B1C45	J2 Pin 13	B1C41	J2 Pin 21	B1C37	J2 Pin 29	B1C33
J2 Pin 6	B0C45	J2 Pin 14	B0C41	J2 Pin 22	B0C37	J2 Pin 30	B0C33
J2 Pin 7	B1C44	J2 Pin 15	B1C40	J2 Pin 23	B1C36	J2 Pin 31	B1C32
J2 Pin 8	B0C44	J2 Pin 16	B0C40	J2 Pin 24	B0C36	J2 Pin 32	B0C32

Lower Column Connection Board Column Pin Assignment

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	B0C0	J3 Pin 9	B0C4	J3 Pin 17	B0C8	J3 Pin 25	B0C12
J3 Pin 2	B1C0	J3 Pin 10	B1C4	J3 Pin 18	B1C8	J3 Pin 26	B1C12
J3 Pin 3	B0C1	J3 Pin 11	B0C5	J3 Pin 19	B0C9	J3 Pin 27	B0C13
J3 Pin 4	B1C1	J3 Pin 12	B1C5	J3 Pin 20	B1C9	J3 Pin 28	B1C13
J3 Pin 5	B0C2	J3 Pin	B0C6	J3 Pin	B0C10	J3 Pin	B0C14

		13		21		29	
J3 Pin 6	B1C2		B1C6	J3 Pin	B1C10		B1C14
		14		22		30	
J3 Pin 7	B0C3	J3 Pin	B0C7	J3 Pin	B0C11	J3 Pin	B0C15
		15		23		31	
J3 Pin 8	B1C3	J3 Pin	B1C7	J3 Pin	B1C11	J3 Pin	B1C15
		16		24		32	

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	B0C16	J2 Pin 9	B0C20	J2 Pin 17	B0C24	J2 Pin 25	B0C28
J2 Pin 2	B1C16	J2 Pin 10	B1C20	J2 Pin 18	B1C24	J2 Pin 26	B1C28
J2 Pin 3	B0C17	J2 Pin 11	B0C21	J2 Pin 19	B0C25	J2 Pin 27	B0C29
J2 Pin 4	B1C17	J2 Pin 12	B1C21	J2 Pin 20	B1C25	J2 Pin 28	B1C29
J2 Pin 5	B0C18	J2 Pin 13	B0C22	J2 Pin 21	B0C26	J2 Pin 29	B0C30
J2 Pin 6	B1C18	J2 Pin 14	B1C22	J2 Pin 22	B1C26	J2 Pin 30	B1C30
J2 Pin 7	B0C19	J2 Pin 15	B0C23	J2 Pin 23	B0C27	J2 Pin 31	B0C31
J2 Pin 8	B1C19	J2 Pin 16	B1C23	J2 Pin 24	B1C27	J2 Pin 32	B1C31

Row Pin Connections

The NI TB-2643 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

Pin Number Row

1	B0R0
2	B1R0
3	B0R1
4	B1R1
5	B0R2
6	B1R2
7	B0R3
8	B1R3
9–16	

Row Protection Bypass Header

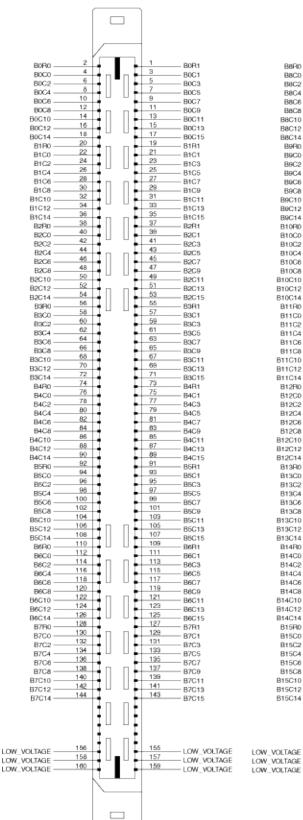
The row ribbon cable headers are isolated from the reed relays through 100 Ω resistors. To bypass these resistors, install a jumper in the appropriate position of J5 on the switch module interface board. The following table lists possible jumper locations.

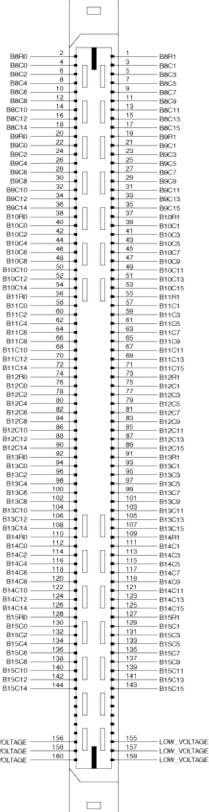
Pin Connected	Bypassed Row
1–2	B0R0
3–4	B1R0
5–6	B0R1
7–8	B1R1
9–10	B0R2
11–12	B1R2
13–14	B0R3
15–16	B1R3

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





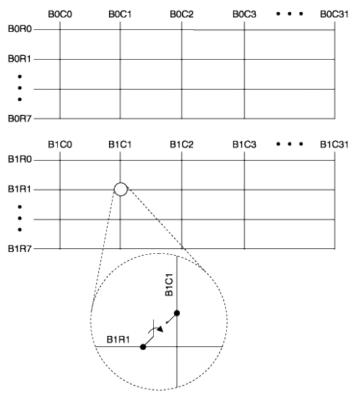
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 1-Wire Dual 8×32 Matrix Topology

The <u>NI TB-2644</u> terminal block creates a <u>1-wire</u> dual 8×32 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 1-wire dual 8×32 matrix topology.



Making a Connection

For bank 0, both the scanning command, b0r1 > b0c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters b0r1 and b0c1, result in the following connection:

signal connected to B0R1 is routed to B0C1

For bank 1, both the scanning command, b1r1 > b1c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters b1r1 and b1c1, result in the following connection:

signal connected to B1R1 is routed to B1C1

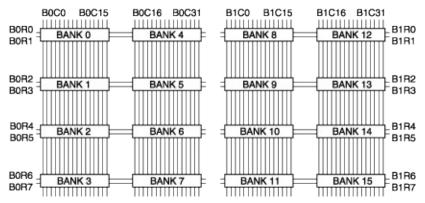


Note While you can, for example, connect B0R1 to B0C0, you cannot connect B0R1 directly to B1C1 in this topology.

Terminal Block Connections

The NI TB-2644 terminal block connects the banks of the NI PXI-2532 to create the 1-wire dual 8×32 matrix topology. The following figure illustrates how the native banks on the NI PXI-2532 connect using the NI TB-2644 to create the 1-wire dual 8×32 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2644 column connection board.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	B0C0	J3 Pin 9	B0C4	J3 Pin 17	B0C8	J3 Pin 25	B0C12
J3 Pin 2	B1C0	J3 Pin 10	B1C4	J3 Pin 18	B1C8	J3 Pin 26	B1C12
J3 Pin 3	B0C1	J3 Pin 11	B0C5	J3 Pin 19	B0C9	J3 Pin 27	B0C13
J3 Pin 4	B1C1	J3 Pin 12	B1C5	J3 Pin 20	B1C9	J3 Pin 28	B1C13
J3 Pin 5	B0C2	J3 Pin 13	B0C6	J3 Pin 21	B0C10	J3 Pin 29	B0C14
J3 Pin 6	B1C2	J3 Pin 14	B1C6	J3 Pin 22	B1C10	J3 Pin 30	B1C14
J3 Pin 7	B0C3	J3 Pin 15	B0C7	J3 Pin 23	B0C11	J3 Pin 31	B0C15

Column Connection Board Column Pin Assignment

J3 Pin 8	B1C3	J3 Pin	B1C7	J3 Pin	B1C11	J3 Pin	B1C15
		16		24		32	

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	B0C16	J2 Pin 9	B0C20	J2 Pin 17	B0C24	J2 Pin 25	B0C28
J2 Pin 2	B1C16	J2 Pin 10	B1C20	J2 Pin 18	B1C24	J2 Pin 26	B1C28
J2 Pin 3	B0C17	J2 Pin 11	B0C21	J2 Pin 19	B0C25	J2 Pin 27	B0C29
J2 Pin 4	B1C17	J2 Pin 12	B1C21	J2 Pin 20	B1C25	J2 Pin 28	B1C29
J2 Pin 5	B0C18	J2 Pin 13	B0C22	J2 Pin 21	B0C26	J2 Pin 29	B0C30
J2 Pin 6	B1C18	J2 Pin 14	B1C22	J2 Pin 22	B1C26	J2 Pin 30	B1C30
J2 Pin 7	B0C19	J2 Pin 15	B0C23	J2 Pin 23	B0C27	J2 Pin 31	B0C31
J2 Pin 8	B1C19	J2 Pin 16	B1C23	J2 Pin 24	B1C27	J2 Pin 32	B1C31

Row Pin Connections

The NI TB-2644 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

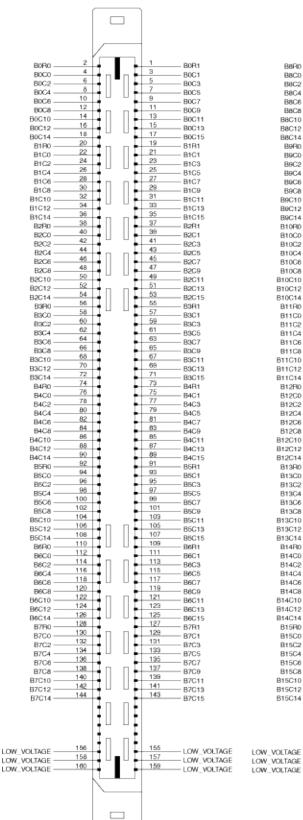
Pin Number	Row
1	B0R0
2	B1R0
3	B0R1
4	B1R1
5	B0R2

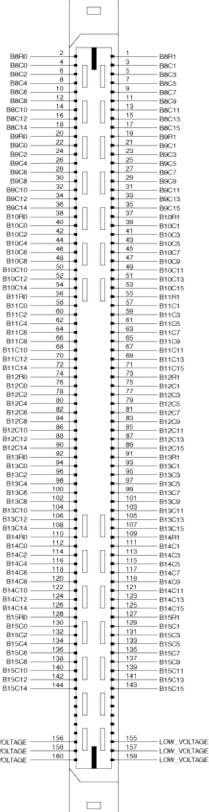
6	B1R2
7	B0R3
8	B1R3
9	B0R4
10	B1R4
11	B0R5
12	B1R5
13	B0R6
14	B1R6
15	B0R7
16	B1R7

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





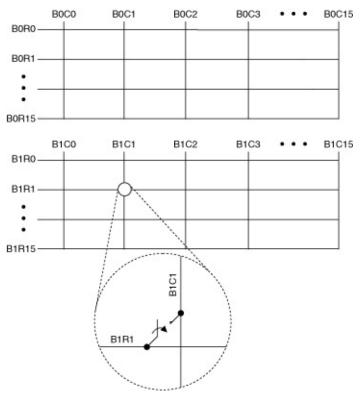
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 1-Wire Dual 16×16 Matrix Topology

The <u>NI TB-2645</u> terminal block creates a <u>1-wire</u> dual 16×16 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 1-wire dual 16×16 matrix topology.



Making a Connection

For bank 0, both the scanning command, b0r1 > b0c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters b0r1 and b0c1, result in the following connection:

signal connected to B0R1 is routed to B0C1

For bank 1, both the scanning command, b1r1 > b1c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters b1r1 and b1c1, result in the following connection:

signal connected to B1R1 is routed to B1C1

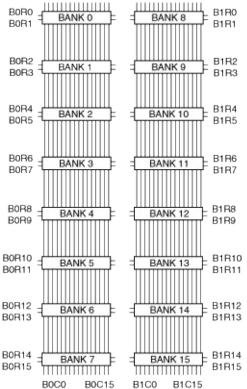


Note While you can, for example, connect B0R1 to B0C0, you cannot connect B0R1 directly to B1C1 in this topology.

Terminal Block Connections

The NI TB-2645 terminal block connects the banks of the NI PXI-2532 to create the 1-wire dual 16×16 matrix topology. The following figure illustrates how the native banks on the NI PXI-2532 connect using the NI TB-2645 to create the 1-wire dual 16×16 matrix topology.

BOCO BOC15 B1C0 B1C15 B0B0 JULIUL B1B0



The following table lists the pin assignments for the NI TB-2644 column connection board.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	B0C0	J3 Pin 9	B0C4	J3 Pin 17	B0C8	J3 Pin 25	B0C12
J3 Pin 2	B1C0	J3 Pin 10	B1C4	J3 Pin 18	B1C8	J3 Pin 26	B1C12
J3 Pin 3	B0C1	J3 Pin 11	B0C5	J3 Pin 19	B0C9	J3 Pin 27	B0C13

Column Connection Board Column Pin Assignment

J3 Pin 4	B1C1	J3 Pin 12	B1C5	J3 Pin 20	B1C9	J3 Pin 28	B1C13
J3 Pin 5	B0C2	J3 Pin 13	B0C6	J3 Pin 21	B0C10	J3 Pin 29	B0C14
J3 Pin 6	B1C2	J3 Pin 14	B1C6	J3 Pin 22	B1C10	J3 Pin 30	B1C14
J3 Pin 7	B0C3	J3 Pin 15	B0C7	J3 Pin 23	B0C11	J3 Pin 31	B0C15
J3 Pin 8	B1C3	J3 Pin 16	B1C7	J3 Pin 24	B1C11	J3 Pin 32	B1C15

Note The column connection board J2 connector is *not* used in this configuration.

Row Pin Connections

The following tables list the pin assignments for row connection.

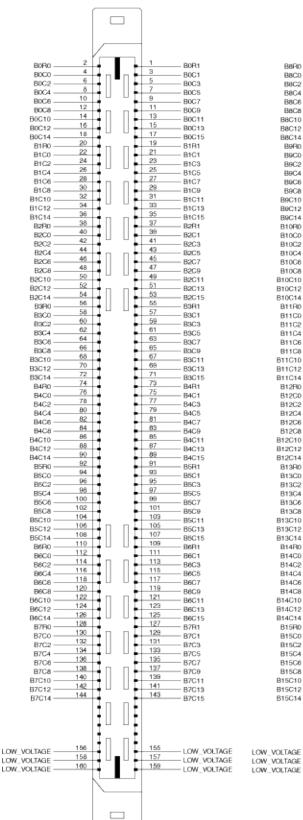
Pin Number	Row
J2 Pin 1	B0R0
J2 Pin 2	B1R0
J2 Pin 3	B0R1
J2 Pin 4	B1R1
J2 Pin 5	B0R2
J2 Pin 6	B1R2
J2 Pin 7	B0R3
J2 Pin 8	B1R3
J2 Pin 9	B0R4
J2 Pin 10	B1R4
J2 Pin 11	B0R5
J2 Pin 12	B1R5
J2 Pin 13	B0R6
J2 Pin 14	B1R6
J2 Pin 15	B0R7
J2 Pin 16	B1R7

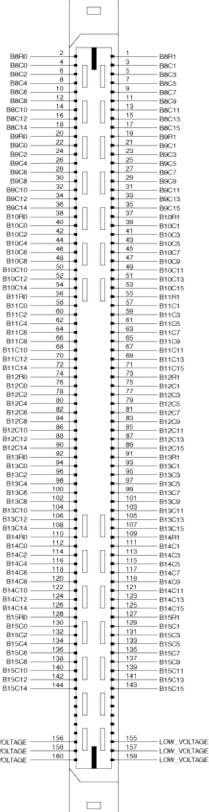
Pin Number	Row
J3 Pin 1	B0R8
J3 Pin 2	B1R8
J3 Pin 3	B0R9
J3 Pin 4	B1R9
J3 Pin 5	B0R10
J3 Pin 6	B1R10
J3 Pin 7	B0R11
J3 Pin 8	B1R11
J3 Pin 9	B0R12
J3 Pin 10	B1R12
J3 Pin 11	B0R13
J3 Pin 12	B1R13
J3 Pin 13	B0R14
J3 Pin 14	B1R14
J3 Pin 15	B0R15
J3 Pin 16	B1R15

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





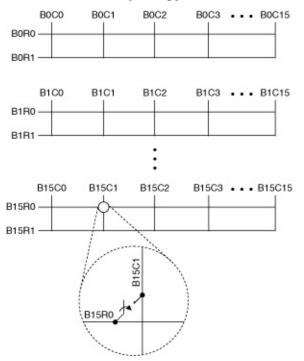
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 1-Wire Sixteen 2×16 Matrix Topology

The following figure represents the NI PXI-2532 in the <u>1-wire</u> sixteen 2×16 matrix topology.



Making a Connection

Both the scanning command, b15r0-b15c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters b15r0 and b15c1, result in the following connection:

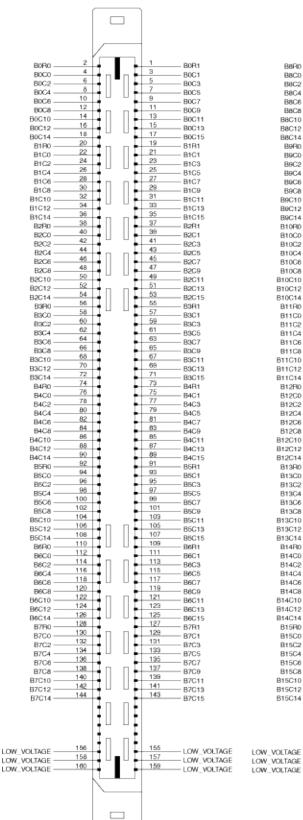
signal connected to B15R0 is routed to B15C1

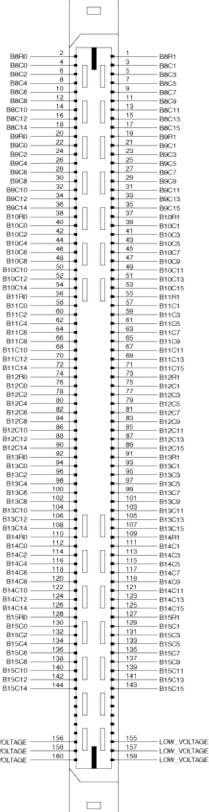
Note While you can, for example, connect B0R1 to B0C0, you cannot connect B0R1 directly to B1C1 in this topology.

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





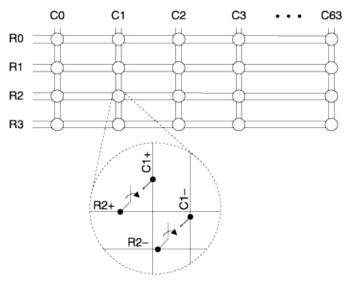
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 2-Wire 4×64 Matrix Topology

The NI TB-2643 terminal block creates a 2-wire 4×64 matrix topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 2-wire 4×64 matrix topology.



Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connections:

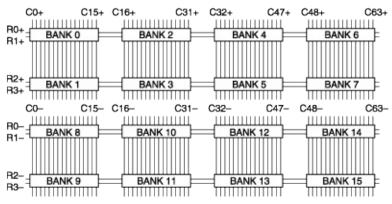
signal connected to R2+ is routed to C1+

signal connected to R2- is routed to C1-

Terminal Block Connections

The NI TB-2643 terminal block connects banks of the NI PXI-2532 to create the 2-wire 4×64 matrix topology. The following figure illustrates how the native banks of the NI PXI-2532 connect using the NI TB-2643 to create the 2-wire 4×64 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2643 upper and lower column connection boards.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C63–	J3 Pin 9	C59–	J3 Pin 17	C55–	J3 Pin 25	C51–
J3 Pin 2	C63+	J3 Pin 10	C59+	J3 Pin 18	C55+	J3 Pin 26	C51+
J3 Pin 3	C62–	J3 Pin 11	C58–	J3 Pin 19	C54–	J3 Pin 27	C50–
J3 Pin 4	C62+	J3 Pin 12	C58+	J3 Pin 20	C54+	J3 Pin 28	C50+
J3 Pin 5	C61–	J3 Pin 13	C57–	J3 Pin 21	C53–	J3 Pin 29	C49–
J3 Pin 6	C61+	J3 Pin 14	C57+	J3 Pin 22	C53+	J3 Pin 30	C49+
J3 Pin 7	C60–	J3 Pin 15	C56–	J3 Pin 23	C52–	J3 Pin 31	C48–

Upper Column Connection Board Column Pin Assignment

J3 Pin 8	C60+	J3 Pin	C56+	J3 Pin	C52+	J3 Pin	C48+
		16		24		32	

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	C47–	J2 Pin 9	C43–	J2 Pin 17	C39–	J2 Pin 25	C35–
J2 Pin 2	C47+	J2 Pin 10	C43+	J2 Pin 18	C39+	J2 Pin 26	C35+
J2 Pin 3	C46–	J2 Pin 11	C42–	J2 Pin 19	C38–	J2 Pin 27	C34–
J2 Pin 4	C46+	J2 Pin 12	C42+	J2 Pin 20	C38+	J2 Pin 28	C34+
J2 Pin 5	C45–	J2 Pin 13	C41–	J2 Pin 21	C37–	J2 Pin 29	C33–
J2 Pin 6	C45+	J2 Pin 14	C41+	J2 Pin 22	C37+	J2 Pin 30	C33+
J2 Pin 7	C44–	J2 Pin 15	C40–	J2 Pin 23	C36–	J2 Pin 31	C32–
J2 Pin 8	C44+	J2 Pin 16	C40+	J2 Pin 24	C36+	J2 Pin 32	C32+

Lower Column Connection Board Column Pin Assignment

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C0+	J3 Pin 9	C4+	J3 Pin 17	C8+	J3 Pin 25	C12+
J3 Pin 2	C0–	J3 Pin 10	C4–	J3 Pin 18	C8–	J3 Pin 26	C12–
J3 Pin 3	C1+	J3 Pin 11	C5+	J3 Pin 19	C9+	J3 Pin 27	C13+
J3 Pin 4	C1–	J3 Pin 12	C5–	J3 Pin 20	C9–	J3 Pin 28	C13–
J3 Pin 5	C2+	J3 Pin	C6+	J3 Pin	C10+	J3 Pin	C14+

		13		21		29	
J3 Pin 6	C2–	J3 Pin 14	C6–	J3 Pin 22	C10–	J3 Pin 30	C14–
J3 Pin 7	C3+	J3 Pin 15	C7+	J3 Pin 23	C11+	J3 Pin 31	C15+
J3 Pin 8	C3–	J3 Pin 16	C7–	J3 Pin 24	C11–	J3 Pin 32	C15–

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C16+	J3 Pin 9	C20+	J3 Pin 17	C24+	J3 Pin 25	C28+
J3 Pin 2	C16–	J3 Pin 10	C20–	J3 Pin 18	C24–	J3 Pin 26	C28–
J3 Pin 3	C17+	J3 Pin 11	C21+	J3 Pin 19	C25+	J3 Pin 27	C29+
J3 Pin 4	C17–	J3 Pin 12	C21–	J3 Pin 20	C25–	J3 Pin 28	C29–
J3 Pin 5	C18+	J3 Pin 13	C22+	J3 Pin 21	C26+	J3 Pin 29	C30+
J3 Pin 6	C18–	J3 Pin 14	C22–	J3 Pin 22	C26–	J3 Pin 30	C30–
J3 Pin 7	C19+	J3 Pin 15	C23+	J3 Pin 23	C27+	J3 Pin 31	C31+
J3 Pin 8	C19–	J3 Pin 16	C23–	J3 Pin 24	C27–	J3 Pin 32	C31–

Row Pin Connections

The NI TB-2643 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

Pin Number Row

1	R0+
2	R0-
3	R1+
4	R1–
5	R2+
6	R2–
7	R3+
8	R3–
9–16	

Row Protection Bypass Header

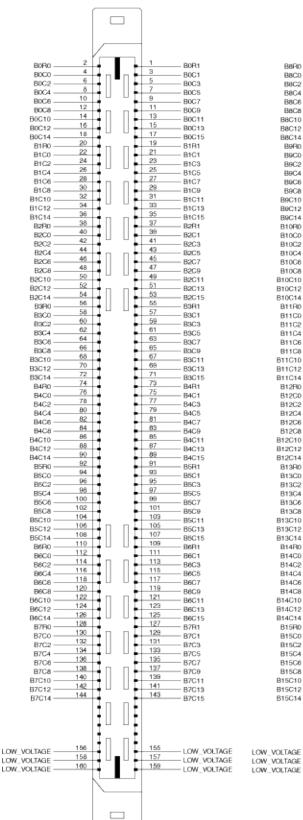
The row ribbon cable headers are isolated from the reed relays through 100 Ω resistors. To bypass these resistors, install a jumper in the appropriate position of J5 on the switch module interface board. The following table lists possible jumper locations.

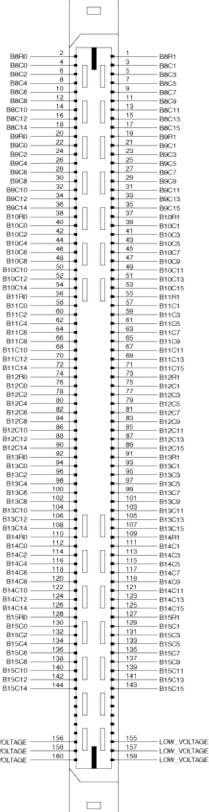
Pin Connected	Bypassed Row
1–2	R0+
3–4	R0–
5–6	R1+
7–8	R1–
9–10	R2+
11–12	R2–
13–14	R3+
15–16	R3–

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





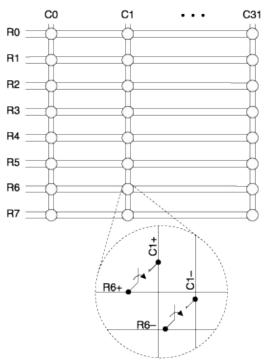
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 2-Wire 8×32 Matrix Topology

The <u>NI TB-2644</u> terminal block creates a <u>2-wire</u> 8×32 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 2-wire 8×32 matrix topology.



Making a Connection

Both the scanning command, r6->c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r6 and c1, result in the following connections:

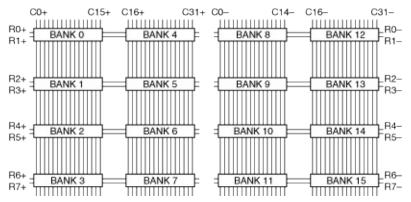
signal connected to R6+ is routed to C1+

signal connected to R6- is routed to C1-

Terminal Block Connections

The NI TB-2644 terminal block connects the banks of the NI PXI-2532 to create the 2-wire 8×32 matrix topology. The following figure illustrates how the native banks on the NI PXI-2532 connect using the NI TB-2644 to create the 2-wire 8×32 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2644 column connection board.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C0+	J3 Pin 9	C4+	J3 Pin 17	C8+	J3 Pin 25	C12+
J3 Pin 2	C0–	J3 Pin 10	C4–	J3 Pin 18	C8–	J3 Pin 26	C12–
J3 Pin 3	C1+	J3 Pin 11	C5+	J3 Pin 19	C9+	J3 Pin 27	C13+
J3 Pin 4	C1–	J3 Pin 12	C5–	J3 Pin 20	C9–	J3 Pin 28	C13–
J3 Pin 5	C2+	J3 Pin 13	C6+	J3 Pin 21	C10+	J3 Pin 29	C14+
J3 Pin 6	C2–	J3 Pin 14	C6–	J3 Pin 22	C10–	J3 Pin 30	C14–
J3 Pin 7	C3+	J3 Pin 15	C7+	J3 Pin 23	C11+	J3 Pin 31	C15+
J3 Pin 8	C3–	J3 Pin	C7–	J3 Pin	C11–	J3 Pin	C15–

10 24 32

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J2 Pin 1	C16+	J2 Pin 9	C20+	J2 Pin 17	C24+	J2 Pin 25	C28+
J2 Pin 2	C16–	J2 Pin 10	C20–	J2 Pin 18	C24–	J2 Pin 26	C28–
J2 Pin 3	C17+	J2 Pin 11	C21+	J2 Pin 19	C25+	J2 Pin 27	C29+
J2 Pin 4	C17–	J2 Pin 12	C21–	J2 Pin 20	C25–	J2 Pin 28	C29–
J2 Pin 5	C18+	J2 Pin 13	C22+	J2 Pin 21	C26+	J2 Pin 29	C30+
J2 Pin 6	C18–	J2 Pin 14	C22–	J2 Pin 22	C26–	J2 Pin 30	C30–
J2 Pin 7	C19+	J2 Pin 15	C23+	J2 Pin 23	C27+	J2 Pin 31	C31+
J2 Pin 8	C19–	J2 Pin 16	C23–	J2 Pin 24	C27–	J2 Pin 32	C31–

Row Pin Connections

The NI TB-2644 provides two ribbon cable headers for row connection. Use one cable header to connect to your application. Use the other cable header for <u>column expansion</u>.

The following table lists the pin assignments for row connection.

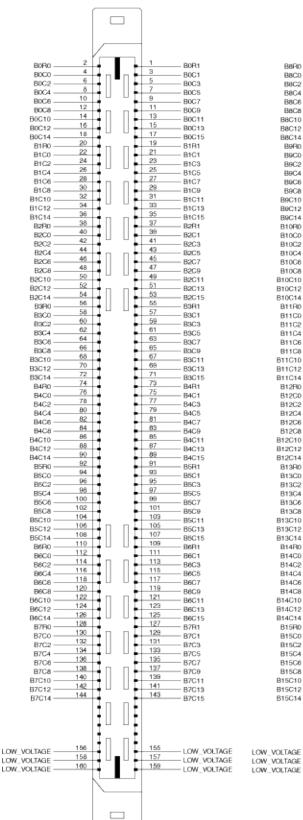
Pin Number	Row
1	RO+
2	R0-
3	R1+
4	R1–
5	R2+
6	R2–

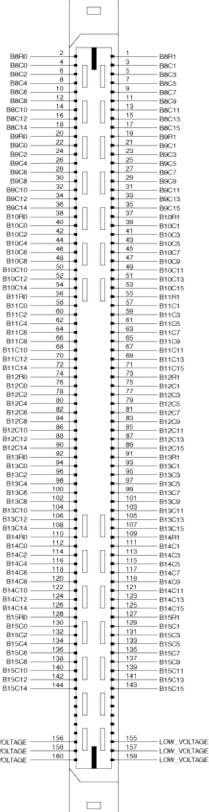
7	R3+
8	R3–
9	R4+
10	R4–
11	R5+
12	R5–
13	R6+
14	R6–
15	R7+
16	R7–

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





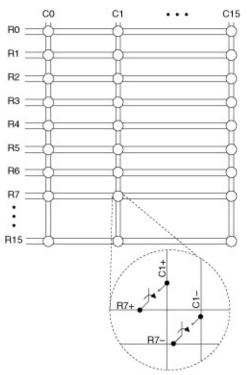
Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 2-Wire 16×16 Matrix Topology

The <u>NI TB-2645</u> terminal block creates a <u>2-wire</u> 16×16 <u>matrix</u> topology with the NI PXI-2532. The following figure represents the NI PXI-2532 in the 2-wire 16×16 matrix topology.



Making a Connection

Both the scanning command, r6->c1;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r6 and c1, result in the following connections:

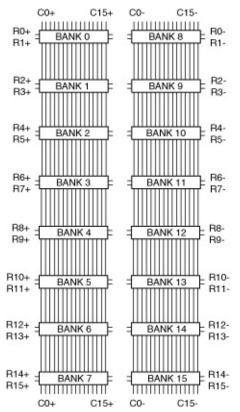
signal connected to R6+ is routed to C1+

signal connected to R6- is routed to C1-

Terminal Block Connections

The NI TB-2645 terminal block connects the banks of the NI PXI-2532 to create the 2-wire 16×16 matrix topology. The following figure illustrates how the native banks on the NI PXI-2532 connect using the NI TB-2645 to create the 2-wire 16×16 matrix topology.

Bank Connection Diagram



The following tables list the pin assignments for the NI TB-2645 column connection board.

Pin Number	Column	Pin Number	Column	Pin Number	Column	Pin Number	Columr
J3 Pin 1	C0+	J3 Pin 9	C4+	J3 Pin 17	C8+	J3 Pin 25	C12+
J3 Pin 2	C0–	J3 Pin 10	C4–	J3 Pin 18	C8–	J3 Pin 26	C12–
J3 Pin 3	C1+	J3 Pin 11	C5+	J3 Pin 19	C9+	J3 Pin 27	C13+

Column Connection Board Column Pin Assignment

J3 Pin 4	C1–	J3 Pin 12	C5–	J3 Pin 20	C9–	J3 Pin 28	C13–
J3 Pin 5	C2+	J3 Pin 13	C6+	J3 Pin 21	C10+	J3 Pin 29	C14+
J3 Pin 6	C2–	J3 Pin 14	C6–	J3 Pin 22	C10–	J3 Pin 30	C14–
J3 Pin 7	C3+	J3 Pin 15	C7+	J3 Pin 23	C11+	J3 Pin 31	C15+
J3 Pin 8	C3–	J3 Pin 16	C7–	J3 Pin 24	C11–	J3 Pin 32	C15–



Note The column connection board J2 connector is *not* used in this configuration.

Row Pin Connections

The following tables list the pin assignments for row connection.

Pin Number	Row
J2 Pin 1	R0+
J2 Pin 2	R0–
J2 Pin 3	R1+
J2 Pin 4	R1–
J2 Pin 5	R2+
J2 Pin 6	R2–
J2 Pin 7	R3+
J2 Pin 8	R3–
J2 Pin 9	R4+
J2 Pin 10	R4–
J2 Pin 11	R5+
J2 Pin 12	R5–
J2 Pin 13	R6+
J2 Pin 14	R6–
J2 Pin 15	R7+

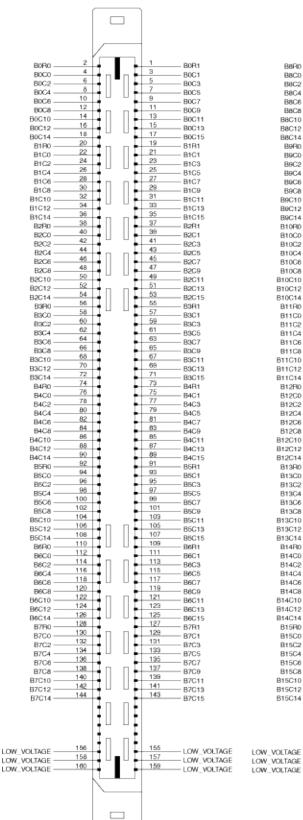
J2 Pin 16 R7–

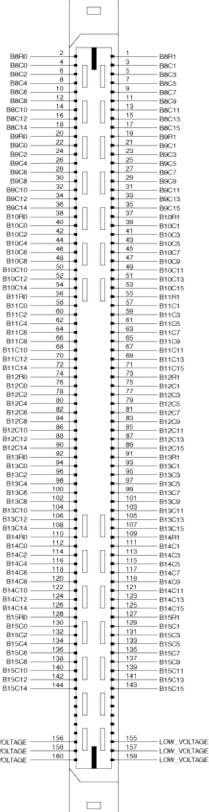
Pin Number	Row
J3 Pin 1	R8+
J3 Pin 2	R8–
J3 Pin 3	R9+
J3 Pin 4	R9–
J3 Pin 5	R10+
J3 Pin 6	R10–
J3 Pin 7	R11+
J3 Pin 8	R11–
J3 Pin 9	R12+
J3 Pin 10	R12–
J3 Pin 11	R13+
J3 Pin 12	R13–
J3 Pin 13	R14+
J3 Pin 14	R14–
J3 Pin 15	R15+
J3 Pin 16	R15–

Pinout

The following figure identifies the pins for the NI PXI-2532.

Left Connector





Right Connector



Caution Low-voltage pins are reserved for future use. These pins should remain disconnected and isolated from row and column channels when high voltage is present.

NI PXI-2532 Matrix Expansion

You can expand the matrices of the NI PXI-2532 by increasing the number of columns in the matrix.

To expand the number of columns, use the terminal block ribbon cable headers to connect the rows on adjacent terminal blocks. The following table lists the available terminal blocks and matrix configurations.

Terminal Block	Configuration (Row x Column)
<u>NI TB-2640</u>	4×128
<u>NI TB-2641</u>	8×64
<u>NI TB-2642</u>	16×32
<u>NI TB-2643</u>	Dual 4×64
<u>NI TB-2643</u>	2-wire 4×64
<u>NI TB-2644</u>	Dual 8×32
<u>NI TB-2644</u>	2-wire 8×32

Refer to Application Note 174 at <u>ni.com/zone</u> for additional information.

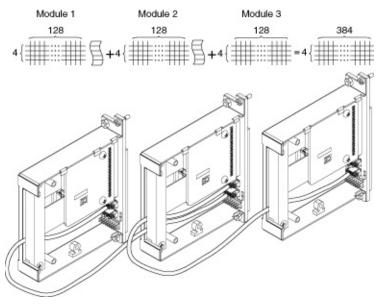
Column Expansion on the NI PXI-2532

The NI TB-2640/2641/2642/2643/2644 terminal blocks provide ribbon cable headers to connect the rows on two adjacent terminal blocks and expand the number of columns of a matrix.

The column expansion procedure is the same for all of the terminal block modules. The following figure illustrates how to use ribbon cables to connect rows on multiple NI TB-2640 modules and expand the number of columns.

Complete the following steps to expand the number of columns of a matrix.

- 1. Connect one end of the ribbon cable to a row ribbon cable header on one of the NI TB-2640 terminal blocks.
- 2. Connect the other end of the ribbon cable to a row ribbon cable header on another NI TB-2640 terminal block.



NI PXI-2532 Triggering

The NI PXI-2532 can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2532.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2532.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2532 Relay Replacement

The NI PXI-2532 uses reed relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
Meder	CRR05-1A

Complete the following sets of steps to disassemble your switch module, replace a failed relay, and reassemble your switch module.

Disassemble the Switch Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your switch module from electrostatic discharge.
- 2. Locate the relay you want to replace.
 - a. Determine the channel name for the relay using the Bank Connection Diagram for your topology.
 - b. Match the channel name to its corresponding relay name using the following tables.

Channel Name	Relay Name	Channel Name	Relay Name	Channel Name	Relay Name	
B8ROC0	K144	B10R0C0	K176	B12R0CO	K193	I
B8ROC1	K143	B10R0C1	K175	B12R0C1	K194	ł
B8ROC2	K142	B10R0C2	K174	B12R0C2	K195	ł
B8ROC3	K141	B10R0C3	K173	B12R0C3	K196	ł
B8ROC4	K140	B10R0C4	K172	B12R0C4	K197	ł
B8ROC5	K139	B10R0C5	K171	B12R0C5	K198	ł
B8ROC6	K138	B10R0C6	K170	B12R0C6	K199	ł
B8ROC7	K137	B10R0C7	K169	B12R0C7	K200	ł
B8ROC8	K136	B10R0C8	K168	B12R0C8	K201	ł
B8ROC9	K135	B10R0C9	K167	B12R0C9	K202	ŀ
•	•		•			

Top Mezzanine Board Relay Locations

B8ROC10	K134	B10R0C10	K166	B12R0C10	K203	E
B8ROC11	K133	B10R0C11	K165	B12R0C11	K204	ł
B8ROC12	K132	B10R0C12	K164	B12R0C12	K205	E
B8ROC13	K131	B10R0C13	K163	B12R0C13	K206	E
B8ROC14	K130	B10R0C14	K162	B12R0C14	K207	E
B8ROC15	K129	B10R0C15	K161	B12R0C15	K208	E
B8R1C0	K1	B10R1C0	K33	B12R1C0	K80	ł
B8R1C1	K2	B10R1C1	K34	B12R1C1	K79	E
B8R1C2	K3	B10R1C2	K35	B12R1C2	K78	E
B8R1C3	K4	B10R1C3	K36	B12R1C3	K77	E
B8R1C4	K5	B10R1C4	K37	B12R1C4	K76	E
B8R1C5	K6	B10R1C5	K38	B12R1C5	K75	E
B8R1C6	K7	B10R1C6	K39	B12R1C6	K74	E
B8R1C7	K8	B10R1C7	K40	B12R1C7	K73	E
B8R1C8	K9	B10R1C8	K41	B12R1C8	K72	E
B8R1C9	K10	B10R1C9	K42	B12R1C9	K71	E
B8R1C10	K11	B10R1C10	K43	B12R1C10	K70	E
B8R1C11	K12	B10R1C11	K44	B12R1C11	K69	E
B8R1C12	K13	B10R1C12	K45	B12R1C12	K68	E
B8R1C13	K14	B10R1C13	K46	B12R1C13	K67	E
B8R1C14	K15	B10R1C14	K47	B12R1C14	K66	ł
B8R1C15	K16	B10R1C15	K48	B12R1C15	K65	E
B9R0CO	K160	B11R0CO	K192	B13R0C0	K209	E
B9R0C1	K159	B11R0C1	K191	B13R0C1	K210	E
B9R0C2	K158	B11R0C2	K190	B13R0C2	K211	E
B9R0C3	K157	B11R0C3	K189	B13R0C3	K212	E
B9R0C4	K156	B11R0C4	K188	B13R0C4	K213	E
B9R0C5	K155	B11R0C5	K187	B13R0C5	K214	E
B9R0C6	K154	B11R0C6	K186	B13R0C6	K215	E
B9R0C7	K153	B11R0C7	K185	B13R0C7	K216	E

B9R0C8	K152	B11R0C8	K184	B13R0C8	K217	E
B9R0C9	K151	B11R0C9	K183	B13R0C9	K218	E
B9R0C10	K150	B11R0C10	K182	B13R0C10	K219	f
B9R0C11	K149	B11R0C11	K181	B13R0C11	K220	f
B9R0C12	K148	B11R0C12	K180	B13R0C12	K221	f
B9R0C13	K147	B11R0C13	K179	B13R0C13	K222	I
B9R0C14	K146	B11R0C14	K178	B13R0C14	K223	ł
B9R0C15	K145	B11R0C15	K177	B13R0C15	K224	f
B9R1C0	K17	B11R1C0	K49	B13R1C0	K96	I
B9R1C1	K18	B11R1C1	K50	B13R1C1	K95	f
B9R1C2	K19	B11R1C2	K51	B13R1C2	K94	ł
B9R1C3	K20	B11R1C3	K52	B13R1C3	K93	f
B9R1C4	K21	B11R1C4	K53	B13R1C4	K92	E
B9R1C5	K22	B11R1C5	K54	B13R1C5	K91	ł
B9R1C6	K23	B11R1C6	K55	B13R1C6	K90	f
B9R1C7	K24	B11R1C7	K56	B13R1C7	K89	ł
B9R1C8	K25	B11R1C8	K57	B13R1C8	K88	E
B9R1C9	K26	B11R1C9	K58	B13R1C9	K87	E
B9R1C10	K27	B11R1C10	K59	B13R1C10	K86	E
B9R1C11	K28	B11R1C11	K60	B13R1C11	K85	E
B9R1C12	K29	B11R1C12	K61	B13R1C12	K84	ł
B9R1C13	K30	B11R1C13	K62	B13R1C13	K83	ł
B9R1C14	K31	B11R1C14	K63	B13R1C14	K82	f
B9R1C15	K32	B11R1C15	K64	B13R1C15	K81	E

Bottom Mezzanine Board Relay Locations

			-	Channel Name	-	
BOROC0	K144	B2R0C0	K176	B4ROCO	K193	B
BOROC1	K143	B2R0C1	K175	B4ROC1	K194	B
BOROC2	K142	B2R0C2	K174	B4ROC2	K195	B
BOILOOL		BEINOOL		BIIIGOL	1.100	Ľ

BOROC3	K141	B2R0C3	K173	B4ROC3	K196	В
BOROC4	K140	B2R0C4	K172	B4ROC4	K197	В
BOROC5	K139	B2R0C5	K171	B4ROC5	K198	В
BOROC6	K138	B2R0C6	K170	B4ROC6	K199	В
BOROC7	K137	B2R0C7	K169	B4ROC7	K200	В
BOROC8	K136	B2R0C8	K168	B4ROC8	K201	В
BOROC9	K135	B2R0C9	K167	B4ROC9	K202	В
BOROC10	K134	B2R0C10	K166	B4ROC1O	K203	В
BOROC11	K133	B2R0C11	K165	B4ROC11	K204	В
BOROC12	K132	B2R0C12	K164	B4ROC12	K205	В
BOROC13	K131	B2R0C13	K163	B4ROC13	K206	В
BOROC14	K130	B2R0C14	K162	B4ROC14	K207	В
BOROC15	K129	B2R0C15	K161	B4ROC15	K208	В
BOR1C0	K1	B2R1C0	K33	B4R1C0	K80	В
BOR1C1	K2	B2R1C1	K34	B4R1C1	K79	В
BOR1C2	K3	B2R1C2	K35	B4R1C2	K78	В
BOR1C3	K4	B2R1C3	K36	B4R1C3	K77	В
BOR1C4	K5	B2R1C4	K37	B4R1C4	K76	В
BOR1C5	K6	B2R1C5	K38	B4R1C5	K75	В
BOR1C6	K7	B2R1C6	K39	B4R1C6	K74	В
BOR1C7	K8	B2R1C7	K40	B4R1C7	K73	В
BOR1C8	K9	B2R1C8	K41	B4R1C8	K72	В
BOR1C9	K10	B2R1C9	K42	B4R1C9	K71	В
BOR1C10	K11	B2R1C10	K43	B4R1C10	K70	В
BOR1C11	K12	B2R1C11	K44	B4R1C11	K69	В
BOR1C12	K13	B2R1C12	K45	B4R1C12	K68	В
BOR1C13	K14	B2R1C13	K46	B4R1C13	K67	В
BOR1C14	K15	B2R1C14	K47	B4R1C14	K66	В
BOR1C15	K16	B2R1C15	K48	B4R1C15	K65	В
B1ROCO	K160	B3ROC0	K192	B5R0C0	K209	В

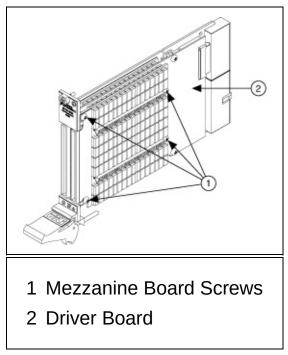
B1ROC1	K159	B3ROC1	K191	B5R0C1	K210	В
B1ROC2	K158	B3ROC2	K190	B5R0C2	K211	В
B1ROC3	K157	B3ROC3	K189	B5R0C3	K212	В
B1ROC4	K156	B3ROC4	K188	B5R0C4	K213	В
B1ROC5	K155	B3ROC5	K187	B5R0C5	K214	В
B1ROC6	K154	B3ROC6	K186	B5R0C6	K215	В
B1ROC7	K153	B3ROC7	K185	B5R0C7	K216	В
B1ROC8	K152	B3ROC8	K184	B5R0C8	K217	В
B1ROC9	K151	B3ROC9	K183	B5R0C9	K218	В
B1ROC1O	K150	B3ROC10	K182	B5R0C10	K219	В
B1ROC11	K149	B3ROC11	K181	B5R0C11	K220	В
B1ROC12	K148	B3ROC12	K180	B5R0C12	K221	В
B1ROC13	K147	B3ROC13	K179	B5R0C13	K222	В
B1ROC14	K146	B3ROC14	K178	B5R0C14	K223	В
B1ROC15	K145	B3ROC15	K177	B5R0C15	K224	В
B1R1CO	K17	B3R1CO	K49	B5R1CO	K96	В
B1R1C1	K18	B3R1C1	K50	B5R1C1	K95	В
B1R1C2	K19	B3R1C2	K51	B5R1C2	K94	В
B1R1C3	K20	B3R1C3	K52	B5R1C3	K93	В
B1R1C4	K21	B3R1C4	K53	B5R1C4	K92	В
B1R1C5	K22	B3R1C5	K54	B5R1C5	K91	В
B1R1C6	K23	B3R1C6	K55	B5R1C6	K90	В
B1R1C7	K24	B3R1C7	K56	B5R1C7	K89	В
B1R1C8	K25	B3R1C8	K57	B5R1C8	K88	В
B1R1C9	K26	B3R1C9	K58	B5R1C9	K87	В
B1R1C10	K27	B3R1C10	K59	B5R1C10	K86	В
B1R1C11	K28	B3R1C11	K60	B5R1C11	K85	В
B1R1C12	K29	B3R1C12	K61	B5R1C12	K84	В
B1R1C13	K30	B3R1C13	K62	B5R1C13	K83	В
B1R1C14	K31	B3R1C14	K63	B5R1C14	K82	В

B1R1C15 K32 B3R1C15 K64 B5R1C15 K81 B

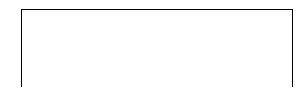
- c. Use the relay name to locate the relay on the mezzanine board.
 - Note Relay names are printed on the mezzanine boards.
- 3. Refer to <u>Top Mezzanine Board Relay Replacement</u> if the relay you want to replace is located on the top mezzanine board. Refer to <u>Bottom Mezzanine Board Relay Replacement</u> if the relay you want to replace is located on the bottom mezzanine board.

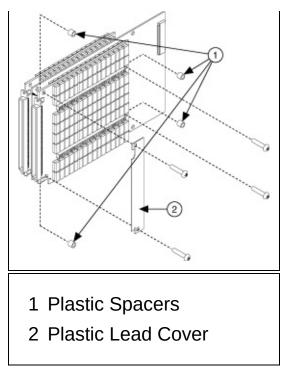
Top Mezzanine Board Relay Replacement

1. Remove the top mezzanine board screws.



2. Separate the top mezzanine board from the driver board and retain the plastic spacers from between the boards. Do not remove the plastic lead cover.

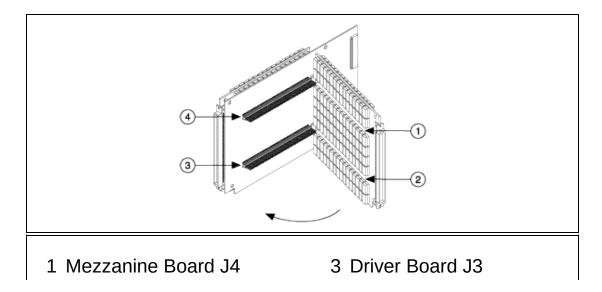




3. Use a hot air station to replace the relays.

Note The replacement relay pads must be pre-tinned.

4. Reconnect the top mezzanine board to the driver board by aligning pin holes 179 and 180 on the J4 and J5 connectors of the top mezzanine board with pins 179 and 180 of the J3 and J4 connectors on the driver board. Fold the mezzanine board over onto the driver board as shown in the following figure. Leave approximately 64 mm of clearance between the mezzanine board and the driver board. Do not press the boards together.

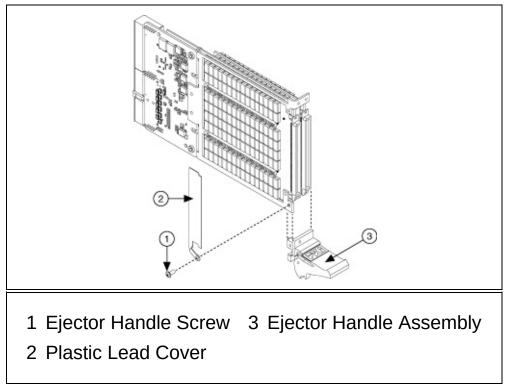


Connector	Connector
2 Mezzanine Board J5	4 Driver Board J4
Connector	Connector

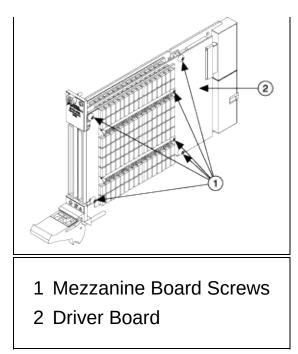
- 5. Replace the plastic spacers between the driver board and top mezzanine board.
- 6. Secure the top mezzanine board to the driver board using the screws from step 1.

Bottom Mezzanine Board Relay Replacement

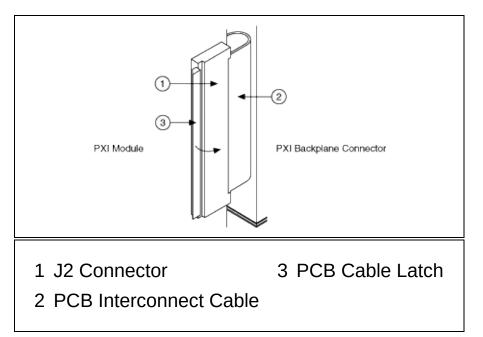
1. Remove the ejector handle assembly screw. Do not remove the plastic lead cover.



2. Remove the mezzanine board screws.

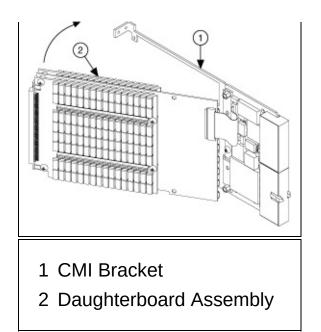


3. Disconnect the PCB interconnect cable by lifting the PCB cable latch on the J2 connector.

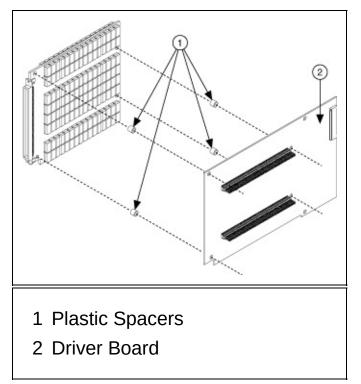


4. Separate the daughterboard assembly from the CMI bracket.





5. Separate the bottom mezzanine board from the driver board and retain the plastic spacers from between the boards.

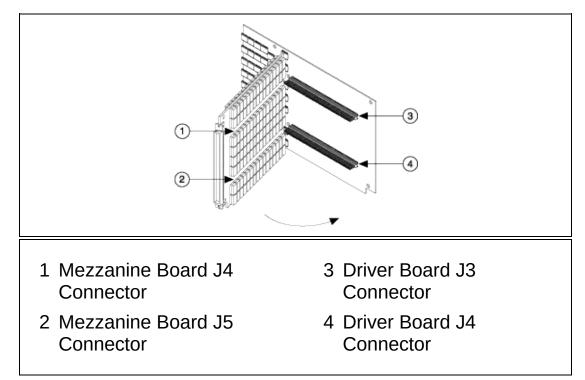


6. Use a hot air station to replace the relays.

Note The replacement relay pads must be pre-tinned.

7. Reconnect the bottom mezzanine board to the driver board by aligning pin holes 179 and 180 on the J4 and J5 connectors of

the bottom mezzanine board with pins 179 and 180 of the J3 and J4 connectors on the driver board. Fold the mezzanine board over onto the driver board as shown in the following figure. Leave approximately 64 mm of clearance between the mezzanine board and the driver board. Do not press the boards together.



- 8. Connect the PCB interconnect cable to the J2 connector on the bottom mezzanine board.
- 9. Reconnect the daughterboard to the CMI bracket.
- 10. Replace the plastic spacers between the driver board and bottom mezzanine board.
- 11. Secure the daughterboard assembly to the CMI bracket using the screws from step 2.
- 12. Replace the ejector handle assembly screw from step 1.
- **Tip** In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2533

The NI PXI-2533 is a 256-crosspoint, high-density <u>matrix</u> switch module for the PXI platform. The NI PXI-2533 is composed of <u>SSR relays</u>.

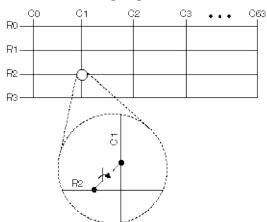
Operation Modes

The following table lists the supported topology of the NI PXI-2533 and possible <u>operation modes</u>.

Topology	Software Name	Im
	2533/1-Wire 4x64 Matrix (NISWITCH_TOPOLOGY_2533_1_WIRE_4X64_MATRIX)	

NI PXI-2533 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2533.

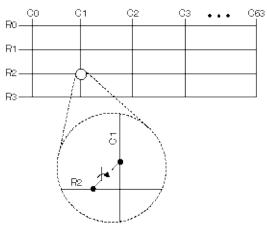


The following table lists relay names for the NI PXI-2533.

Relays						
kR0C0	kR0C63					
kR1C0	kR1C63					
kR2C0	kR2C63					
kR3C0	kR3C63					

NI PXI-2533 1-Wire 4×64 Matrix Topology

The following figure represents the NI PXI-2533 in the 1-wire 4×64 matrix topology.



Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

signal connected to R2 is routed to C1

Pinout

The following figure identifies the pins for the NI PXI-2533.

C1	35	1	CO
C3	36	2	C2
C5	37	3	C4
C7	38	4	Cб
C9	39	5	C8
C11	40	б	C 10
C 13	41	7	C 12
C 15	42	8	C 14
C 17	43	9	C 16
C 19	44	10	C 18
C21	45	11	C20
C23	46	12	C22
C25	47	13	C24
C27	48	14	C26
C29	49	15	C28
C31	50	16	C30
C63	51	17	C62
C61	52	18	C60
C59	53	19	C58
C57	54	20	C 55
055	55	21	C54
C53	56	22	C52
C51	57	23	C50
C49	58	24	C48
C47	59	25	C46
C45	60	26	C44
C43	61	27	C42
C41	62	28	C40
C39	63	29	C38
C37	64	30	C36
C35	65	31	C34
C33	66	32	C32
R2	67	33	R3
RO	68	34	R1
	~	~)

NI PXI-2533 Triggering

The NI PXI-2533 can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2533.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2533.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2534

The NI PXI-2534 is a 256-crosspoint, high-density <u>matrix</u> switch module for the PXI platform. The NI PXI-2534 is composed of <u>SSR relays</u>.

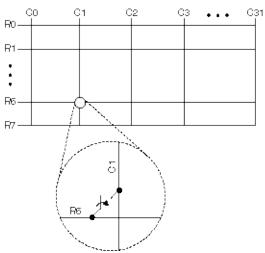
Operation Modes

The following table lists the supported topology of the NI PXI-2534 and possible <u>operation modes</u>.

Topology	Software Name	Im
	2534/1-Wire 8x32 Matrix (NISWITCH_TOPOLOGY_2534_1_WIRE_8X32_MATRIX)	

NI PXI-2534 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2534.

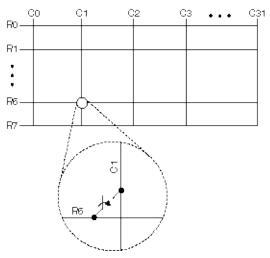


The following table lists relay names for the NI PXI-2534.

Relays		
kR0C0kR0C31		
kR1C0kR1C31		
kR2C0kR2C31		
kR3C0kR3C31		
kR4C0kR4C31		
kR5C0kR5C31		
kR6C0kR6C31		
kR7C0kR7C31		

NI PXI-2534 1-Wire 8×32 Matrix Topology

The following figure represents the NI PXI-2534 in the 1-wire 8×32 matrix topology.



Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

signal connected to R2 is routed to C1

Pinout

The following figure identifies the pins for the NI PXI-2534.

	مسر)
C1	35	1	CO
C3	36	2	C2
C5	37	3	C4
C7	38	4	Сб
Č9	39	5	Ca
C11	40	6	C10
C13	41	7	C12
C15	42	8	C14
C17	43	9	C16
C19	44	10	C18
C21	45	11	C20
C23	46	12	C22
C25	47	13	G24
C27	48	14	C26
C29	49	15	C28
C31	50	16	C30
R4	51	17	R5
Rõ	52	18	67
NC	53	19	NC.
NC	54	20	NG
NC	55	21	NC
NC	56	22	NG
NC	57	23	NG
NC	58	24	NG
NC	59	25	NC
NC	1 and 1	26	NG
NC	61	27	NC
NG	62	28	NG
NC	63	29	NG
NC	64	30	NG
NC	65	31	NC
NC	66	32	NG
R2	67	33	R3
RO	68	34	R1
	-		
\sim			

NC = No Connect

NI PXI-2534 Triggering

The NI PXI-2534 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2534.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2534.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2535

The NI PXI-2535 is a 544-crosspoint, high-density <u>matrix</u> switch module for the PXI platform. The NI PXI-2535 is composed of <u>FET switches</u>.

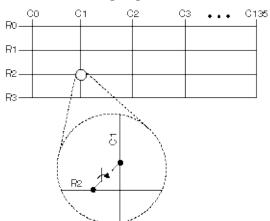
Operation Modes

The following table lists the supported topology of the NI PXI-2535 and possible <u>operation modes</u>.

Topology	Software Name	lr
<u>1-Wire</u> <u>4×136</u> Matrix	2535/1-Wire 4x136 Matrix (NISWITCH_TOPOLOGY_2535_1_WIRE_4X136_MATRIX)	

NI PXI-2535 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2535.

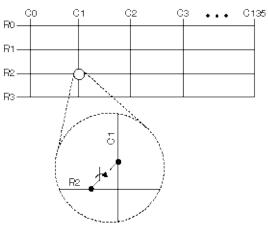


The following table lists relay names for the NI PXI-2535.

Relays	
kR0C0kR0C135	
kR1C0kR1C135	
kR2C0kR2C135	
kR3C0kR3C135	

NI PXI-2535 1-Wire 4×136 Matrix Topology

The following figure represents the NI PXI-2535 in the 1-wire 4×136 matrix topology.



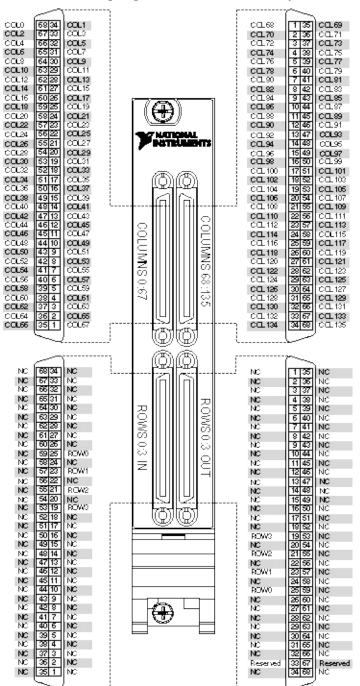
Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

signal connected to R2 is routed to C1

Pinout

The following figure identifies the pins for the NI PXI-2535.



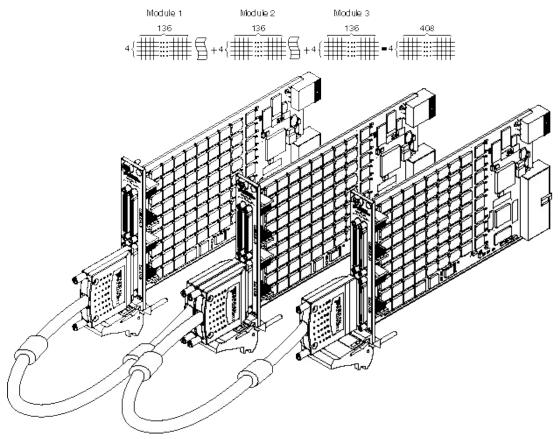
NI PXI-2535 Matrix Expansion

You can expand the matrices of the NI PXI-2535 by increasing the number of columns in the matrix using the SHC68-C68-S cable.

Column Expansion on the NI PXI-2535

Complete the following steps to expand the number of columns of a matrix.

- 1. Connect one end of the SHC68-C68-S cable to a row connector on the NI PXI-2535.
- 2. Connect the other end of the SHC68-C68-S cable to a row connector on another NI PXI-2535.



NI PXI-2535 Triggering

The NI PXI-2535 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2535.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2535.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2536

The NI PXI-2536 is a 544-crosspoint, high-density <u>matrix</u> switch module for the PXI platform. The NI PXI-2536 is composed of <u>FET switches</u>.

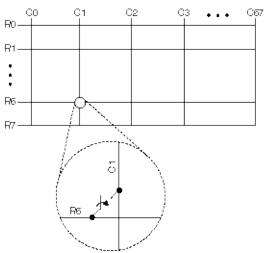
Operation Modes

The following table lists the supported topology of the NI PXI-2536 and possible <u>operation modes</u>.

Topology	Software Name	Im
	2536/1-Wire 8x68 Matrix (NISWITCH_TOPOLOGY_2536_1_WIRE_8X68_MATRIX)	

NI PXI-2536 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2536.

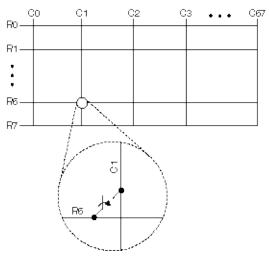


The following table lists relay names for the NI PXI-2536.

Relays		
kR0C0kR0C67		
kR1C0kR1C67		
kR2C0kR2C67		
kR3C0kR3C67		
kR4C0kR4C67		
kR5C0kR5C67		
kR6C0kR6C67		
kR7C0kR7C67		

NI PXI-2536 1-Wire 8×68 Matrix Topology

The following figure represents the NI PXI-2536 in the 1-wire 8×68 matrix topology.



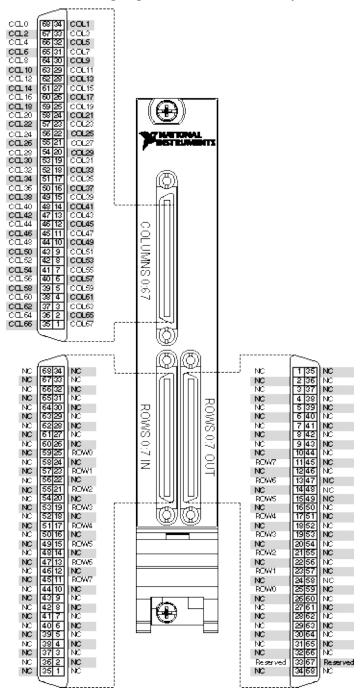
Making a Connection

Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

signal connected to R2 is routed to C1

Pinout

The following figure identifies the pins for the NI PXI-2536.



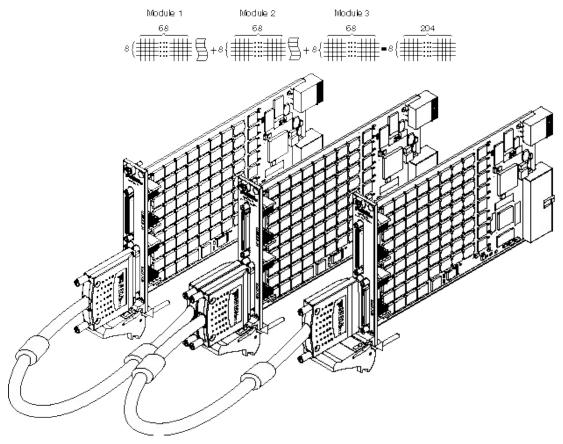
NI PXI-2536 Matrix Expansion

You can expand the matrices of the NI PXI-2536 by increasing the number of columns in the matrix using the SHC68-C68-S cable.

Column Expansion on the NI PXI-2536

Complete the following steps to expand the number of columns of a matrix.

- 1. Connect one end of the SHC68-C68-S cable to a row connector on the NI PXI-2536.
- 2. Connect the other end of the SHC68-C68-S cable to a row connector on another NI PXI-2536.



NI PXI-2536 Triggering

The NI PXI-2536 can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2536.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2536.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2545

The NI PXI-2545 is a terminated <u>multiplexer</u> switch module for the PXI bus that can carry 50 Ω <u>RF signals</u> up to 2.7 GHz.

Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2545 and possible <u>operation modes</u>.

Topology	Software Name
	2545/4×1 Terminated Mux (NISWITCH_TOPOLOGY_2545_4×1_TERMINATED_MUX)

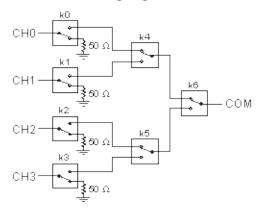
NI PXI-2545 Front Panel

The following figure illustrates the NI PXI-2545 front panel.



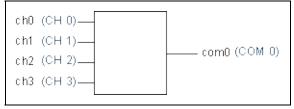
NI PXI-2545 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2545.



NI PXI-2545 Terminated 4×1 Multiplexer (SP4T) Topology

The following figure represents the NI PXI-2545 in the terminated 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)



Caution The terminators on the NI PXI-2545 are rated for 1.5 W at 25 °C. When operating at ambient temperatures greater than 25 °C, a termination power derating applies. Refer the *NI PXI-2545 Specifications* for more information about termination power derating. Terminators *cannot* withstand the full rated power of the NI PXI-2545.

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, call the <u>niSwitch</u> <u>Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.



Note All channels are disconnected from COM when the NI PXI-2545 is in its power on state. Any input channel *not* connected to COM is connected to its associated 50 Ω terminator.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1 and COM and the other between CH 2 and COM:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1 and com.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1 and com.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com.

When <u>scanning</u> the NI PXI-2545, a typical <u>scan list</u> entry might be ch1->com;. This entry routes the signal connected to CH 1 to COM.

NI PXI-2545 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2545.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2545.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2546

The NI PXI-2546 is a <u>multiplexer</u> switch module for the PXI bus that can carry 50 Ω <u>RF signals</u> up to 2.7 GHz.

Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2546 and possible <u>operation modes</u>.

Topology	Software Name	Immedia
<u>Dual 4×1</u>	2546/Dual 4x1 Mux	~
Multiplexer	(NISWITCH_TOPOLOGY_2546_DUAL_4X1_MUX)	

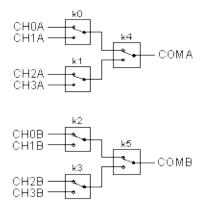
NI PXI-2546 Front Panel

The following figure illustrates the NI PXI-2546 front panel.



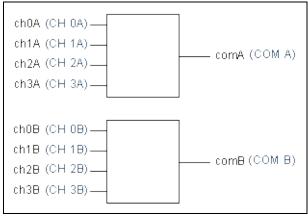
NI PXI-2546 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2546.



NI PXI-2546 Dual 4×1 Multiplexer (Dual SP4T) Topology

The following figure represents the NI PXI-2546 in the dual 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel of each of the 4x1 multiplexers is always connected to the common channel. If you have reset the module or called the <u>niSwitch Disconnect All</u> <u>Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (ch0) from COM upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1A and COM A and the other between CH 2B and COM B:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1A and comA.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1A and comA.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2B and comB.

When <u>scanning</u> the NI PXI-2546, a typical <u>scan list</u> entry might be ch1A->comA;. This entry routes the signal connected to CH 1A to COM A.

NI PXI-2546 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2546.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2546.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2547

The NI PXI-2547 is a <u>multiplexer</u> switch module for the PXI bus that can carry 50 Ω <u>RF signals</u> up to 2.7 GHz.

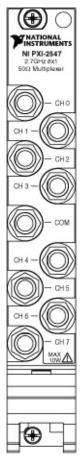
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2547 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>8×1</u>	2547/8x1 Mux	~	
Multiplexer	(NISWITCH_TOPOLOGY_2547_8X1_MUX)		

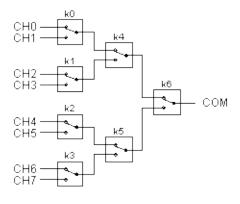
NI PXI-2547 Front Panel

The following figure illustrates the NI PXI-2547 front panel.



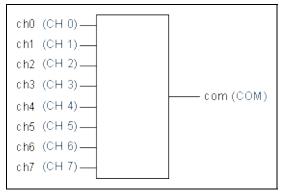
NI PXI-2547 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2547.



NI PXI-2547 8×1 Multiplexer (SP8T) Topology

The following figure represents the NI PXI-2547 in the 8×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel of the 8×1 multiplexer is always connected to the common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (ch0) from COM upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1 and COM and the other between CH 2 and COM:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1 and com.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1 and com.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com.

When <u>scanning</u> the NI PXI-2547, a typical <u>scan list</u> entry might be ch1->com;. This entry routes the signal connected to CH 1 to COM.

NI PXI-2547 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2547.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2547.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2548

The NI PXI-2548 is a 4-channel, general-purpose switch module for the PXI bus that can carry 50 Ω <u>RF signals</u> up to 2.7 GHz. The NI PXI-2548 is composed of <u>4-SPDT</u> relays.

Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2548 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scann
4-SPDT	2548/4-SPDT	~	~
	(NISWITCH_TOPOLOGY_2548_4_SPDT)		

NI PXI-2548 Front Panel

The following figure illustrates the NI PXI-2548 front panel.



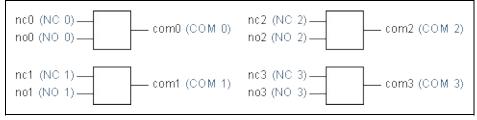
NI PXI-2548 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2548.



NI PXI-2548 Quad SPDT Topology

The following figure represents the NI PXI-2548 in the quad SPDT general-purpose topology.





Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel is always connected to each common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (NC*x*) from COM*x* upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between NO 1 and COM1 and the other between NC 1 and COM1:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters no1 and com1.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters no1 and com1.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters nc1 and com1.

When <u>scanning</u> the NI PXI-2548, a typical <u>scan list</u> entry might be no1->com1;. This entry routes the signal connected to NO 1 to COM 1.

NI PXI-2548 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2548.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2548.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2549

The NI PXI-2549 is a 2-channel, general-purpose switch module for the PXI bus that can carry 50 Ω <u>RF signals</u> up to 2.7 GHz. The NI PXI-2549 is composed of two terminated <u>SPDT</u> relays.

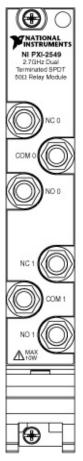
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2549 and possible <u>operation modes</u>.

Topology	Software Name	
Terminated	2549/Terminated 2-SPDT	
<u>2-SPDT</u>	(NISWITCH_TOPOLOGY_2549_TERMINATED_2_SPDT)	

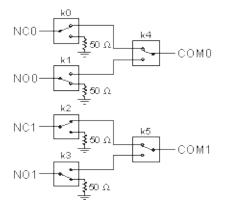
NI PXI-2549 Front Panel

The following figure illustrates the NI PXI-2549 front panel.



NI PXI-2549 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2549.



NI PXI-2549 Dual Terminated SPDT Topology

The following figure represents the NI PXI-2549 in the dual terminated SPDT <u>general-purpose</u> topology.

nc0 (NC 0)	
nc1 (NC 1) com1 (COM 1)	

Legend: Software Name (Hardware Name)

Caution The terminators on the NI PXI-2549 are rated for 1.5 W at 25 °C. When operating at ambient temperatures greater than 25 °C, a termination power derating applies. Refer the *NI PXI-2549 Specifications* for more information about termination power derating. Terminators *cannot* withstand the full rated power of the NI PXI-2549.

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel is always connected to each common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (NC*x*) from COM*x* upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between NO 1 and COM1 and the other between NC 1 and COM1:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters no1 and com1.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters no1 and com1.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters nc1 and com1.

When <u>scanning</u> the NI PXI-2549, a typical <u>scan list</u> entry might be no1->com1;. This entry routes the signal connected to NO 1 to COM 1.

NI PXI-2549 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2549.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2549.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2554

The NI PXI-2554 is a <u>multiplexer</u> switch module for the PXI bus that can carry 75 Ω <u>RF signals</u> up to 2.5 GHz.

Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2554 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>4×1</u>	2554/4x1 Mux	~	
<u>Multiplexer</u>	(NISWITCH_TOPOLOGY_2554_4X1_MUX)		

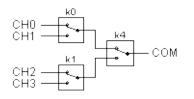
NI PXI-2554 Front Panel

The following figure illustrates the NI PXI-2554 front panel.



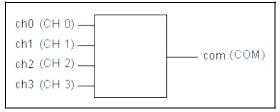
NI PXI-2554 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2554.



NI PXI-2554 4×1 Multiplexer (SP4T) Topology

The following figure represents the NI PXI-2554 in the 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel of the 4x1 multiplexer is always connected to the common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (ch0) from COM upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1 and COM and the other between CH 2 and COM:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1 and com.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1 and com.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com.

When <u>scanning</u> the NI PXI-2554, a typical <u>scan list</u> entry might be ch1->com;. This entry routes the signal connected to CH 1 to COM.

NI PXI-2554 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2554.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2554.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2555

The NI PXI-2555 is a terminated <u>multiplexer</u> switch module for the PXI bus that can carry 75 Ω <u>RF signals</u> up to 2.5 GHz.

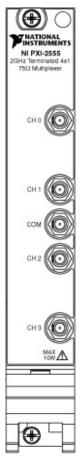
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2555 and possible <u>operation modes</u>.

Topology	Software Name
	2555/4×1 Terminated Mux (NISWITCH_TOPOLOGY_2555_4×1_TERMINATED_MUX)

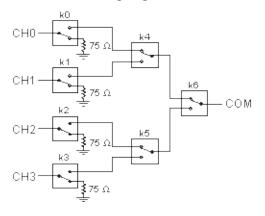
NI PXI-2555 Front Panel

The following figure illustrates the NI PXI-2555 front panel.



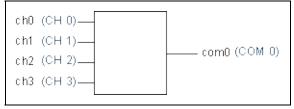
NI PXI-2555 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2555.



NI PXI-2555 Terminated 4×1 Multiplexer (SP4T) Topology

The following figure represents the NI PXI-2555 in the terminated 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)



Caution The terminators on the NI PXI-2555 are rated for 1.5 W at 25 °C. When operating at ambient temperatures greater than 25 °C, a termination power derating applies. Refer the *NI PXI-2555 Specifications* for more information about termination power derating. Terminators *cannot* withstand the full rated power of the NI PXI-2555.

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, call the <u>niSwitch</u> <u>Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.



Note All channels are disconnected from COM when the NI PXI-2555 is in its power on state. Any input channel *not* connected to COM is connected to its associated 75 Ω terminator.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1 and COM and the other between CH 2 and COM:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1 and com.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1 and com.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com.

When <u>scanning</u> the NI PXI-2555, a typical <u>scan list</u> entry might be ch1->com;. This entry routes the signal connected to CH 1 to COM.

NI PXI-2555 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2555.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2555.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2556

The NI PXI-2556 is a <u>multiplexer</u> switch module for the PXI bus that can carry 75 Ω <u>RF signals</u> up to 2.5 GHz.

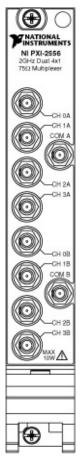
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2556 and possible <u>operation modes</u>.

Topology	Software Name	Immedia
<u>Dual 4×1</u>	2556/Dual 4x1 Mux	~
Multiplexer	(NISWITCH_TOPOLOGY_2556_DUAL_4X1_MUX)	

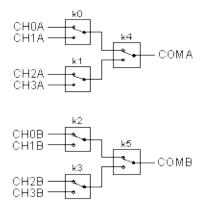
NI PXI-2556 Front Panel

The following figure illustrates the NI PXI-2556 front panel.



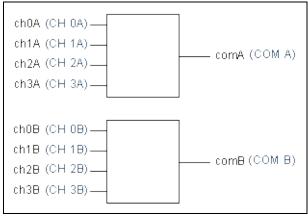
NI PXI-2556 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2556.



NI PXI-2556 Dual 4×1 Multiplexer (Dual SP4T) Topology

The following figure represents the NI PXI-2556 in the dual 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel of each of the 4x1 multiplexers is always connected to the common channel. If you have reset the module or called the <u>niSwitch Disconnect All</u> <u>Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (ch0) from COM upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1A and COM A and the other between CH 2A and COM A:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1A and comA.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1A and comA.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2A and comA.

When <u>scanning</u> the NI PXI-2556, a typical <u>scan list</u> entry might be ch1A->comA;. This entry routes the signal connected to CH 1A to COM A.

NI PXI-2556 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2556.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2556.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2557

The NI PXI-2557 is a <u>multiplexer</u> switch module for the PXI bus that can carry 75 Ω <u>RF signals</u> up to 2.5 GHz.

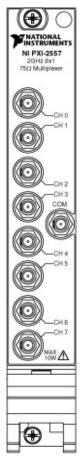
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2557 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>8×1</u>	2557/8x1 Mux	~	
<u>Multiplexer</u>	(NISWITCH_TOPOLOGY_2557_8X1_MUX)		

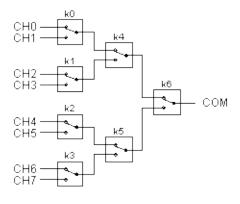
NI PXI-2557 Front Panel

The following figure illustrates the NI PXI-2557 front panel.



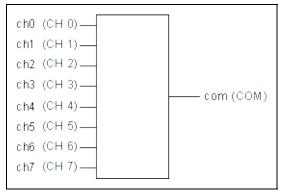
NI PXI-2557 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2557.



NI PXI-2557 8×1 Multiplexer (SP8T) Topology

The following figure represents the NI PXI-2557 in the 8×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel of the 8×1 multiplexer is always connected to the common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (ch0) from COM upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between CH 1 and COM and the other between CH 2 and COM:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch1 and com.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters ch1 and com.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com.

When <u>scanning</u> the NI PXI-2557, a typical <u>scan list</u> entry might be ch1->com;. This entry routes the signal connected to CH 1 to COM.

NI PXI-2557 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2557.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2557.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2558

The NI PXI-2558 is a 4-channel, general-purpose switch module for the PXI bus that can carry 75 Ω <u>RF signals</u> up to 2.5 GHz. The NI PXI-2558 is composed of <u>4-SPDT</u> relays.

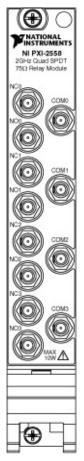
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2558 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scann
<u>4-SPDT</u>	2558/4-SPDT	~	~
	(NISWITCH_TOPOLOGY_2558_4_SPDT)		

NI PXI-2558 Front Panel

The following figure illustrates the NI PXI-2558 front panel.



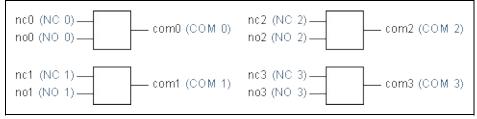
NI PXI-2558 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2558.



NI PXI-2558 Quad SPDT Topology

The following figure represents the NI PXI-2558 in the quad SPDT general-purpose topology.





Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel is always connected to each common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (NC*x*) from COM*x* upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between NO 1 and COM1 and the other between NC 1 and COM1:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters no1 and com1.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters no1 and com1.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters nc1 and com1.

When <u>scanning</u> the NI PXI-2558, a typical <u>scan list</u> entry might be no1->com1;. This entry routes the signal connected to NO 1 to COM 1.

NI PXI-2558 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2558.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2558.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2559

The NI PXI-2559 is a 2-channel, general-purpose switch module for the PXI bus that can carry 75 Ω <u>RF signals</u> up to 2.5 GHz. The NI PXI-2559 is composed of two terminated <u>SPDT</u> relays.

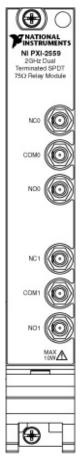
Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2559 and possible <u>operation modes</u>.

Topology	Software Name	
Terminated	2559/Terminated 2-SPDT	
2-SPDT	(NISWITCH_TOPOLOGY_2559_TERMINATED_2_SPDT)	

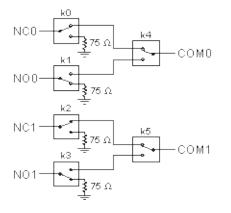
NI PXI-2559 Front Panel

The following figure illustrates the NI PXI-2559 front panel.



NI PXI-2559 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2559.



NI PXI-2559 Dual Terminated SPDT Topology

The following figure represents the NI PXI-2559 in the dual terminated SPDT <u>general-purpose</u> topology.

nc0 (NC 0)	
nc1 (NC 1)	

Legend: Software Name (Hardware Name)

Caution The terminators on the NI PXI-2559 are rated for 1.5 W at 25 °C. When operating at ambient temperatures greater than 25 °C, a termination power derating applies. Refer the *NI PXI-2559 Specifications* for more information about termination power derating. Terminators *cannot* withstand the full rated power of the NI PXI-2559.

Making a Connection

Call the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to connect channels in this topology. If applicable, you must call the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch_Disconnect</u> function to disconnect an existing connection *before* you call the niSwitch Connect Channels VI or the niSwitch_Connect function.

Note The niSwitch Disconnect Channels VI or the niSwitch_Disconnect function does *not* operate the relay until the next niSwitch Connect Channels VI or the next niSwitch_Connect function is executed. Thus, one channel is always connected to each common channel. If you have reset the module or called the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function, you do not need to disconnect the default channel (NC*x*) from COM*x* upon initial connection.

The following sequence of tasks illustrates the VI/function calls necessary to make consecutive connections—one between NO 1 and COM1 and the other between NC 1 and COM1:

- 1. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters no1 and com1.
- 2. Call the niSwitch Disconnect Channels VI or the niSwitch_Disconnect function with parameters no1 and com1.
- 3. Call the niSwitch Connect Channels VI or the niSwitch_Connect function with parameters nc1 and com1.

When <u>scanning</u> the NI PXI-2559, a typical <u>scan list</u> entry might be no1->com1;. This entry routes the signal connected to NO 1 to COM 1.

NI PXI-2559 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2559.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2559.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2564

The NI PXI-2564 is a 16-channel <u>general-purpose</u> power relay module for the PXI platform. The NI PXI-2564 is composed of 16 <u>electromechanical</u> <u>armature</u> latching <u>SPST</u> relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

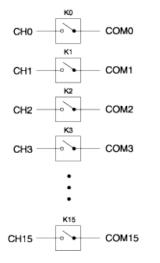
Operation Modes

The following table lists the supported topology of the NI PXI-2564 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>16-SPST</u>	2564/16-SPST	~	~
	(NISWITCH_TOPOLOGY_2564_16_SPST)		

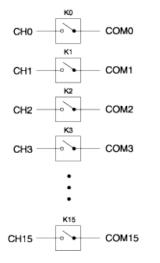
NI PXI-2564 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2564.



NI PXI-2564 16-SPST Topology

The following figure represents the NI PXI-2564 in the 16-SPST topology.



Making a Connection

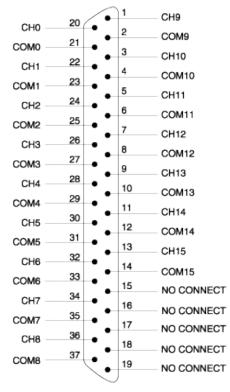
You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com2"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com2").

When scanning the NI PXI-2564, a typical scan list entry could be ch_{2-} >com₂;. This entry closes the relay between CH₂ and COM₂.

Pinout

The following figure identifies the pins for the NI PXI-2564 in the 16-SPST topology.



NI PXI-2564 Triggering

The NI PXI-2564 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2564.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2564.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2564 Relay Replacement

The NI PXI-2564 uses electromechanical armature relays.

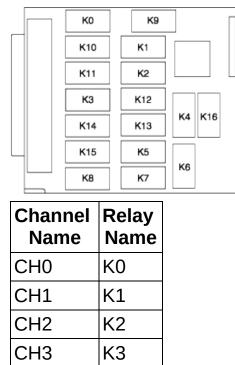
Refer to the following tables for information about ordering replacement relays.

Relay Manufacturer	Part Number
Aromat (NAiS)	DSP1a-DC5V

Relay Kit	Part Number
National Instruments (16 relays)	777880-01

Complete the following sets of steps to disassemble your module and replace a failed relay.

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figure and table for relay locations.



CH4	K4
CH5	K5
CH6	K6
CH7	K7
CH8	K8
CH9	K9
CH10	K10
CH11	K11
CH12	K12
CH13	K13
CH14	K14
CH15	K15

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.

Caution Do *not* use flux remover to clean the board after relay replacement.

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2565

The NI PXI-2565 is a 16-channel <u>general-purpose</u> switch module for the PXI platform. The NI PXI-2565 is composed of 16 <u>SPST</u> relays.



Note For EMC compliance, operate this device with shielded cables.

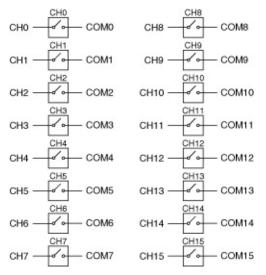
Operation Modes

The following table lists the supported topology of the NI PXI-2565 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>16-SPST</u>	2565/16-SPST	~	~
	(NISWITCH_TOPOLOGY_2565_16_SPST)		

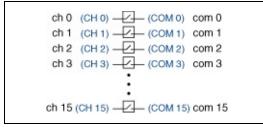
NI PXI-2565 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2565.



NI PXI-2565 16-SPST Topology

The following figure represents the NI PXI-2565 in the 16-SPST topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com2"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com2").

When scanning the NI PXI-2565, a typical scan list entry could be ch_{2-} >com₂;. This entry routes the signal connected to CH₂ to COM₂.

Pinout

The following figure identifies the pins for the NI PXI-2565 in the 16-SPST topology.

	Α	в	
CH0	1	1	CH8
COM0	2	2	COM8
CH1	3	3	CH9
COM1	4	4	COM9
CH2	5	5	CH10
COM2	6	6	COM10
CH3	7	7	CH11
COM3	8	8	COM11
CH4	9	9	CH12
COM4	10	10	COM12
CH5	11	11	CH13
COM5	12	12	COM13
CH6	13	13	CH14
COM6	14	14	COM14
CH7	15	15	CH15
COM7	16	16	COM15

NI PXI-2565 Flyback Voltage Protection

When inductive loads are connected to the relays, a large counter electromotive force may occur at relay switching time because of the energy stored in the inductive load. These flyback voltages can severely damage the relay contacts and significantly shorten the life of the relay.

You can limit flyback voltages at your inductive load by installing a flyback diode for DC loads or a varistor for AC loads. The NI PXI-2565 switch module has solder connections for a diode or varistor. With this diode/varistor installed, you can limit flyback voltages when switching inductive loads.



Caution Before installing the diode or varistor in your module, ensure that no signals are connected to your module front connector.

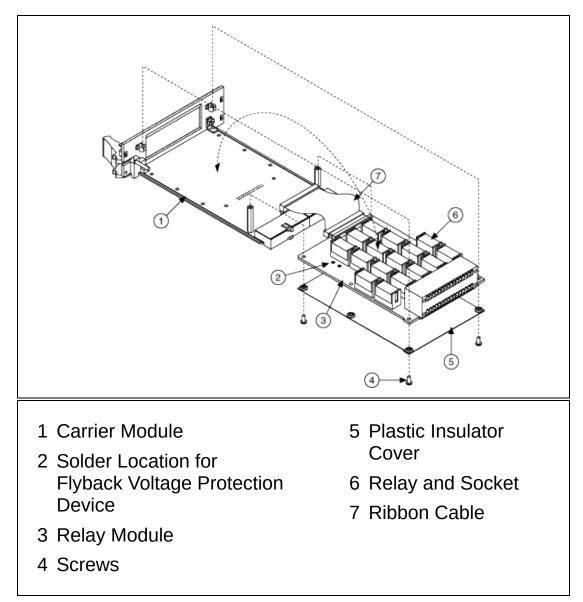
Before installing your switch module in the PXI chassis, install the diode/varistor by performing the following steps. Refer to the following figure.

Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - $\overline{\mathbb{N}}$

Note Properly grounding yourself prevents damage to your module from electrostatic discharge.

2. Loosen the four screws that fasten the relay module to the carrier module and front panel.



- 3. Remove the plastic insulator cover.
- 4. Lift up the card and disconnect the ribbon cable from the relay

module.

Install the Diode/Varistor

- 1. Remove solder, as necessary, from the diode/varistor locations.
- 2. Insert the diode/varistor into the appropriate location, labeled RV*x*, where *x* corresponds to the channel number.
- 3. Solder and trim the leads.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

NI PXI-2565 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2565.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2565.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2565 Relay Replacement

The NI PXI-2565 uses socketed electromechanical relays.

Refer to the following tables for information about ordering replacement relays.

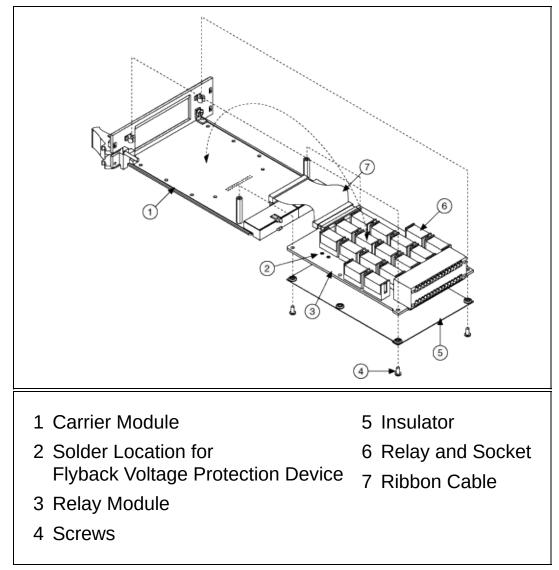
Relay Manufacturer	Part Number
Aromat (NAiS)	DSP1a-DC5V

Relay Kit	Part Number
National Instruments (16 relays)	777880-01

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the four screws that fasten the NI PXI-2565 relay module to the switch carrier module and front panel.
- 3. Lift up the card as shown in the figure below.



4. Remove the relay by gently applying force.

- 5. Before inserting the new relay, match the direction of the relay and the socket.
- 6. Insert the relay, making sure the relay is properly seated and the socket hooks the top of the relay.
- 7. Reassemble your module.

NI PXI-2566

The NI PXI-2566 is a 16-channel <u>general-purpose</u> relay switch module for the PXI platform designed for switching and controlling low-level and power signals.

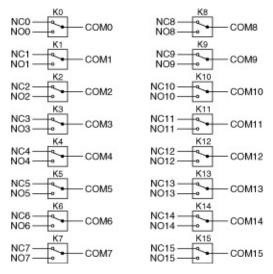
Operation Modes

The following table lists the supported topology of the NI PXI-2566 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>16-SPDT</u>	2566/16-SPDT	~	~
	(NISWITCH_TOPOLOGY_2566_16_SPDT)		

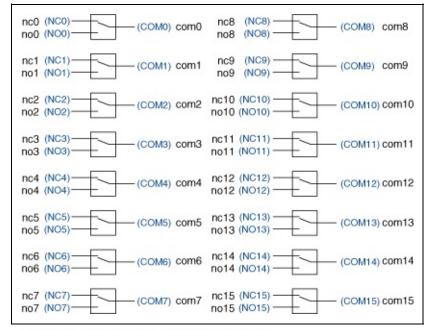
NI PXI-2566 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2566.



NI PXI-2566 16-SPDT Topology

The following figure represents the NI PXI-2566 in the 16-SPDT topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the NO terminal to the COM terminal of that channel, disconnect the NC terminal from the COM of that channel.

For example, to connect NO2 to COM2, use the following code:

```
niSwitch_Disconnect(vi, "nc2", "com2")
```

```
niSwitch_Connect(vi, "no2", "com2")
```



Note To connect NO to COM you do not need to disconnect NC from COM after the module has been reset or a call to the <u>niSwitch</u> <u>Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function has been made.



Note niSwitch_Disconnect(vi, "nc2", "com2") does not activate the relay until niSwitch_Connect(vi, "no2", "com2") is executed.

To connect the NC terminal to the COM terminal of that channel, disconnect the NO terminal from the COM of that channel.

For example, to connect NC2 to COM2, use the following code:

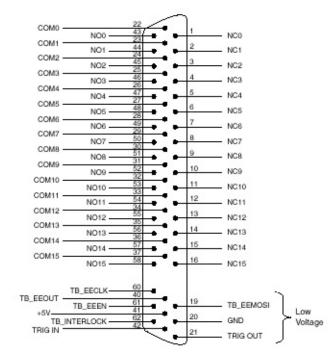
```
niSwitch_Disconnect(vi, "no2", "com2")
```

```
niSwitch_Connect(vi, "nc2", "com2")
```

When scanning the NI PXI-2566, a typical scan list entry could be nc2->com2;. This entry routes the signal connected to NC2 to COM2.

Pinout

The following figure identifies the pins for the NI PXI-2566 in the 16-SPDT topology.



NI PXI-2566 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2566.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG IN on TB- 2666 terminal block

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2566.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG OUT on TB- 2666 terminal block

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2566 Relay Replacement

The NI PXI-2566 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
Aromat (NAiS)	TQ2SA-5V

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.



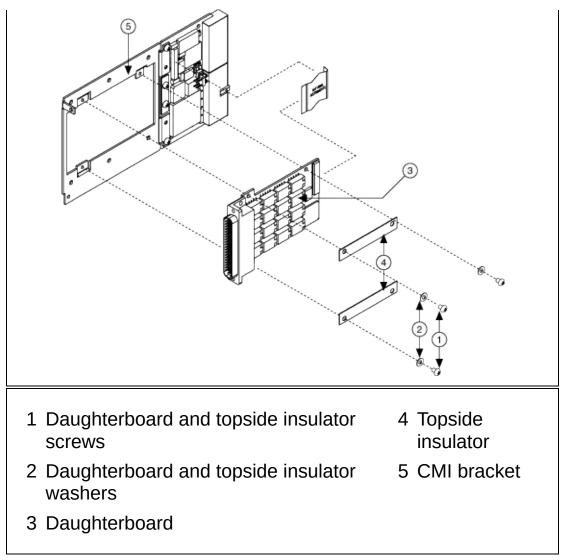
- **Note** Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figure for relay locations.

CH3 CH2 CH1 CH0 (+)	Ì
CH7 CH6 CH5 CH4	
СН11 СН10 СН9 СН8	
CH15 CH14 CH13 CH12	
	1

3. To replace the CH4 through CH11 relays, refer to Replace the Relay.

To replace all other relays, continue on to step 4.

4. Remove the screw and washer connecting the daughterboard and topside insulator to the CMI bracket.



- 5. Remove the topside insulator from the CMI bracket.
- 6. Reconnect the daughterboard to the CMI bracket using the screw and washer from step 4.

Replace the Relay

Before you begin, make sure you have the following items:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

- 1. Remove the screw and washer (from step 6) connecting the daughterboard to the CMI bracket.
- 2. Install the new topside insulator. Refer to the previous figure for the appropriate location.
- 3. Reconnect the daughterboard to the CMI bracket using the screw and washer from step 1. Torque the screw to 2.7 in.-lbs.

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2567

The NI PXI-2567 is a 64-channel general-purpose relay driver module for the PXI platform. The NI PXI-2567 is designed to handle up to 0.6 A drive current and up to 50 V drive voltage. The NI PXI-2567 also has two sources available for driving relays.

Operation Modes

The following table lists the supported topology of the NI PXI-2567 and possible <u>operation modes</u>.

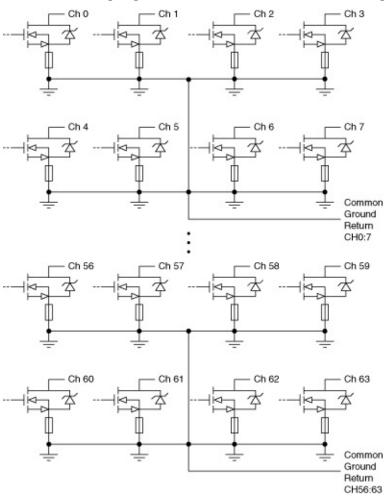


Note Using two channels per relay, the NI PXI-2567 can also control 32 two-coil latching relays.

Topology	Software Name	Immedia
Independent	2567/Independent	~
	(NISWITCH_TOPOLOGY_2567_INDEPENDENT)	

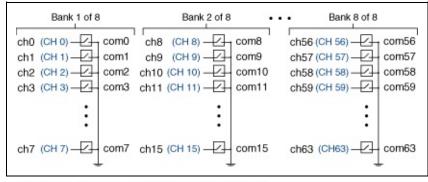
NI PXI-2567 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2567.



NI PXI-2567 Independent Topology

The following figure is a representation of the NI PXI-2567 topology.

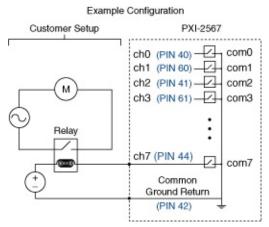


Legend: Software Name (Hardware Name)

Making a Connection

To drive your relay, use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to actuate a relay connected to channel 7, you can connect the positive terminal of your voltage source to one side of the relay coil, and connect the other relay coil terminal to pin 44 of the front connector. Then connect the negative terminal of your voltage source to the common ground return of channel 7 (pin 42). Closing the channel 7 driver completes the circuit, driving your relay. The following figure illustrates how to actuate a relay connected to channel 7.



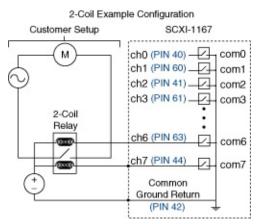
To close the channel 7 relay, call niSwitch_Connect(vi, "ch7", "com7").

Alternatively, you can open and close relays by calling the <u>niSwitch Relay</u> <u>Control</u> VI or the <u>niSwitch_RelayControl</u> function. For the relay name, enter K0 for channel 0, K1 for channel 1, and so on.

When <u>scanning</u> the NI PXI-2567, a typical <u>scan list</u> entry could be ch2->com2;. This entry drives the relay connected to channel 2.

Driving 2-Coil Relays

The following figure shows an example of a configuration using the NI PXI-2567 to drive a 2-coil relay.



To close the relay in this example, you would call niSwitch_Connect(vi, "ch7", "com7"). To open the relay, then you would call niSwitch_Disconnect(vi, "ch7", "com7") and then niSwitch_Connect(vi, "ch6", "com6").

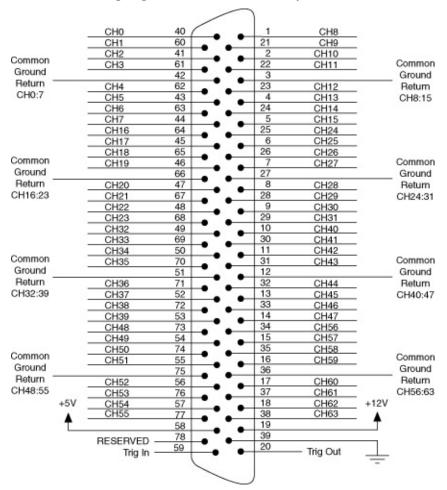
Alternatively, you can actuate the relay by calling the <u>niSwitch Relay</u> <u>Control</u> VI or the <u>niSwitch_RelayControl</u> function. To close the relay in this example, you would call niSwitch_RelayControl(vi, K7,

NISWITCH_VAL_CLOSE_RELAY) to power on the lower coil in the diagram. Then call niSwitch_RelayControl(vi, K7,

NISWITCH_VAL_OPEN_RELAY) to power off the lower coil, and call niSwitch_RelayControl(vi, K6, NISWITCH_VAL_CLOSE_RELAY) power on the other coil and open the relay.

Pinout

The following figure identifies the pins for the NI PXI-2567.



Available 5 V and 12 V Sources

The NI PXI-2567 has a 5 V and a 12 V source available to drive relays. The 5 V source, available on pin 58, can provide up to 1.25 A of current. The 12 V source, available on pin 19, can provide 0.50 A of current.

NI PXI-2567 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2567.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG IN on pin 59

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2567.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG OUT on pin 20

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2568

The NI PXI-2568 is a 31-channel <u>general-purpose</u> relay module for the PXI platform. The NI PXI-2568 is composed of 31 <u>armature</u> latching <u>SPST</u> relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

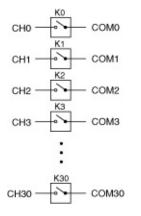
Operation Modes

The following table lists the supported topology of the NI PXI-2568 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>31-SPST</u>	2568/31-SPST	~	~
	(NISWITCH_TOPOLOGY_2568_31_SPST)		

NI PXI-2568 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2568.



NI PXI-2568 31-SPST Topology

The following figure represents the NI PXI-2568 in the 31-SPST topology.

(CH 0) (COM 0)	com0
(CH 1) (COM 1)	com1
(CH 2) (COM 2)	com2
(CH 3) (COM 3)	com3
:	
:	
(CH 30) (COM 30)	com30
	(CH 0) (CM 0) (CH 1) (COM 1) (CH 2) (COM 2) (CH 3) (COM 3) (CH 30) (COM 30)

Legend: Software Name (Hardware Name)

Making a Connection

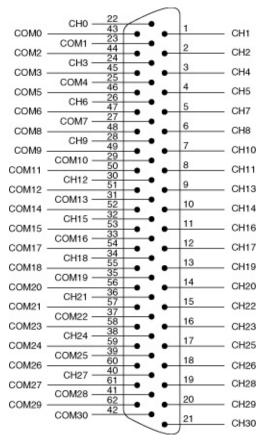
You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com2"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com2").

When scanning the NI PXI-2568, a typical scan list entry could be ch_{2-} >com₂;. This entry closes the relay between CH₂ and COM₂.

Pinout

The following figure identifies the pins for the NI PXI-2568 in the 31-SPST topology.



NI PXI-2568 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2568.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2568.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2568 Relay Replacement

The NI PXI-2568 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

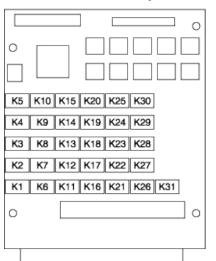
Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

Relay Kit	Part Number
National Instruments (10 relays)	779356-01

Complete the following sets of steps to disassemble your module and replace a failed relay.

Disassemble the Module

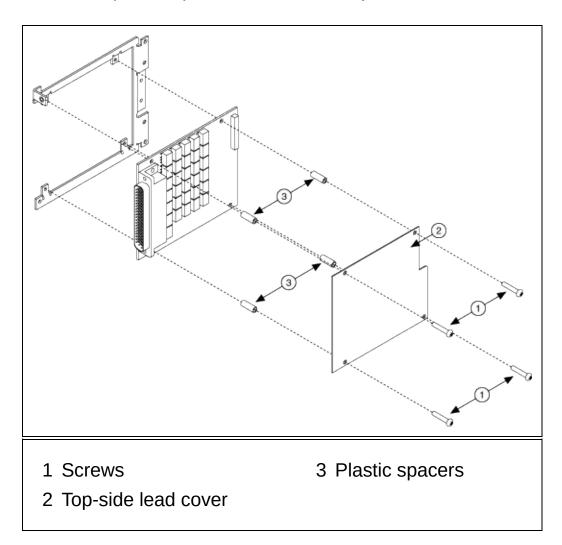
- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figure and table for relay locations.



Channel Name	Relay Name	Channel Name	Relay Name
CH0	K1	CH16	K17
CH1	K2	CH17	K18
CH2	K3	CH18	K19
CH3	K4	CH19	K20
CH4	K5	CH20	K21
CH5	K6	CH21	K22
CH6	K7	CH22	K23
CH7	K8	CH23	K24
CH8	K9	CH24	K25
CH9	K10	CH25	K26
CH10	K11	CH26	K27

CH11	K12	CH27	K28
CH12	K13	CH28	K29
CH13	K14	CH29	K30
CH14	K15	CH30	K31
CH15	K16		

3. Remove the four screws that secure the top-side lead cover. Retain the plastic spacers for reassembly.



Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Reassemble your module using the screws and the plastic spacers removed in <u>Disassemble the Module</u>, step 3.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2569

The NI PXI-2569 is a 100-channel <u>general-purpose</u> relay module for the PXI platform. The NI PXI-2569 is composed of 100 <u>armature</u> latching <u>SPST</u> relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

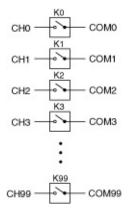
Operation Modes

The following table lists the supported topology of the NI PXI-2569 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>100-</u>	2569/100-SPST	~	
<u>SPST</u>	(NISWITCH_TOPOLOGY_2569_100_SPST)		

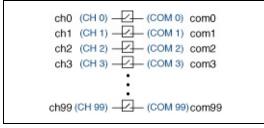
NI PXI-2569 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2569.



NI PXI-2569 100-SPST Topology

The following figure represents the NI PXI-2569 in the 100-SPST topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com2"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com2").

When scanning the NI PXI-2569, a typical scan list entry could be ch_{2-} >com₂;. This entry closes the relay between CH₂ and COM₂.

Pinout

The following figure identifies the pins for the NI PXI-2569 in the 100-SPST topology.

	•	`		_	
		1	_)	-
CH0	COM0 - 150	-	7	0	50 • CH1 • COM1
CH2	COM2 - 149	-	71	0-	50 ° CH1 ° COM1
CH4	COM4 + 148 153		٦ſ	0-	53 • CH5 • COM5
CH6	COM6 0 154		٦ſ	0	47 0017
CH8	COM8 - 146 155		٦ſ	0	46 ° CH9
CH10	COM10 - 145	÷-	Ĵ	-	56 - CH11
	COM12 - 144	•	Ĵ	-	-∺/ → CH13
CH12	COM12 • 157 COM14 • 158	P.	Ĵ	0	58 ° CH15
CH14	0 001440 142	P		0-	50 o CH17
CH16	COM16 - 159 COM18 - 141	•	75	0	42 ° CH17 ° COM17
CH18	0.01400 140	10	36	0-	61 o CH21
CH20	COM20 • 161 COM22 • 139 COM22 • 139 COM24 • 138	•	11	0	40 COM21 62 CH23 COM21
CH22	COM24 - 138	•	32	0-	63 • CH25 • COM23
CH24	0	-0	7	0-	64 • CH07 • COM25
CH26	0 104	•	7	0-	
CH28	COM28 - 185	-0	٦Ľ	0	55 o CH29 56 o CH29 o COM29
CH30	0 166	-0	71	0	66 • CH31 • COM29 35 • CH31 • COM31
CH32	00MB2 0 167	-	71	0	34 COM33
CH34	COM34 - 168	-	71	0	• COM35
CH36	COMBO 0 189	-	71	0	32 ° CH37
CH38	COM38 - 131 170	-	7,	0	31 · CH39 _ COM39
CH40	COM40 - 130		٦ſ	0-	
CH42	COM42 • 171 COM42 • 172 COM42 • 172 COM44 • 173	E.	JĽ	0	- <u>66</u> • CH43
	COM44 - 128	-	Ĵ	-	-∺≓ • CH45
CH44	COM46 • 174	P	Ĵ	-	74 • CH47 • COM45
CH46	COM48 - 126	•	35	0	27 CH47 COM47 75 CH49 COM47 26 CM49
CH48	COM50 - 125	10		0-	- € CH51
CH50	COM52 - 124	•	35	0	
CH52	0 001454 123	-	36	0	24 ° CH55 ° COM53
CH54	COMER 0 122	•	36	0	79 - CUIEZ COM55
CH56	COM58 + 121 COM58 + 121	-	99	0-	80 o CHEO O COM57
CH58		-0	7	0-	21 ° CH59 ° COM59
CH60	0 001100 119	-0	7	0-	20 COM61
CH62	COM62 - 182	-0	71	0	19 ° CH63 ° COM63
CH64	0 UUM04 0 183	-	71	0	B3 ○ CH65 ○ COM63 B4 ○ CH65 ○ COM65
CH66	0 184	-	71	0	17 COM67
CH68	COM68 - 185	-	72	0	16 • CH69 • COM69
CH70	COM/0 - 196	-	75	0	E → CH71 COM69 E → CH71 COM71 E7 → CH73
CH72	COM72 - 114 187	-	71	0	14 COM72
CH74	COM74 - 113	-0	٦ſ	0	13 CH75 COM75
CH76	COM76 - 112 189	6	15	0	89 • CH77 • COM73
	COM78 - 111	-	٦Ľ	0	
CH78		•	Ĵ	-	91 → CH81 COM79
CH80	COM80 • 110 COM82 • 109 COM82 • 109 COM82 • 109	P		0	10 ° CH81 ° COM81
CH82	COM84 - 108	*	7	0	83 → CH85 → COM83
CH84	COM86 • 107	<u>*</u>	-	0	
CH86	COM88 - 105	•	35	0	95 CH89 COM87
CH88	COM90 - 105	•	31	0	6 COM00
CH90	COM90 • 105 COM92 • 104 COM92 • 104	۰	7	0-	97 o CH93 COM91
CH92	COM92 0 197 COM94 0 103	•	1	0-	4 COM93
CH94	0 100	•	7	0-	99 o CH07
CH96		•	7	0	2 COM97
CH98	COM98 • 101 200	0	71	0	100 CH99 COM99
		-	-		100000000000000000000000000000000000000
				-	

NI PXI-2569 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2569.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2569.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2569 Relay Replacement

The NI PXI-2569 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

Relay Kit	Part Number
National Instruments (10 relays)	779356-01

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figures and table for relay locations.

Base Board

							0
0							
К4	K9	K14	K19	K24	K29	K34	K39
К3	K8	K13	K18	K23	K28	K33	K38
K2	K 7	K12	K17	K22	K27	K32	K37
К1	K6	K11	K16	K21	K26	K31	K36
К0	K5	K10	K15	K20	K25	K30	K35
0] 0 [

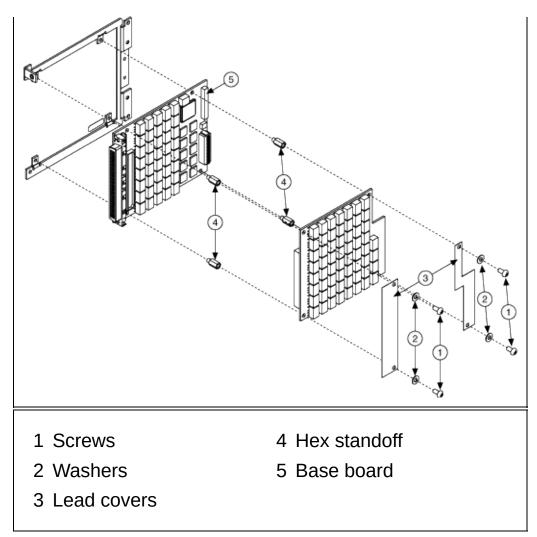
Mezzanine Board

							0
0				K75	K83	K91	K99
K46	K53	K60	K67	K74	K82	K90	K98
K45	K52	K59	K66	K73	K81	K89	K97
K44	K51	K58	K65	K72	K80	K88	K96
K43	K50	K57	K64	K71	K79	K87	K95
K42	K49	K56	K63	K70	K78	K86	K94
K41	K48	K55	K62	K69	K77	K85	K93
K40	K47	K54	K61	K68	K76	K84	K92
0							0

Channel Relay Channel Relay Channel Relay Channel Relay

| Name |
|------|------|------|------|------|------|------|------|
| CH0 | K0 | CH25 | K25 | CH50 | K50 | CH75 | K75 |
| CH1 | K1 | CH26 | K26 | CH51 | K51 | CH76 | K76 |
| CH2 | K2 | CH27 | K27 | CH52 | K52 | CH77 | K77 |
| CH3 | K3 | CH28 | K28 | CH53 | K53 | CH78 | K78 |
| CH4 | K4 | CH29 | K29 | CH54 | K54 | CH79 | K79 |
| CH5 | K5 | CH30 | K30 | CH55 | K55 | CH80 | K80 |
| CH6 | K6 | CH31 | K31 | CH56 | K56 | CH81 | K81 |
| CH7 | K7 | CH32 | K32 | CH57 | K57 | CH82 | K82 |
| CH8 | K8 | CH33 | K33 | CH58 | K58 | CH83 | K83 |
| CH9 | K9 | CH34 | K34 | CH59 | K59 | CH84 | K84 |
| CH10 | K10 | CH35 | K35 | CH60 | K60 | CH85 | K85 |
| CH11 | K11 | CH36 | K36 | CH61 | K61 | CH86 | K86 |
| CH12 | K12 | CH37 | K37 | CH62 | K62 | CH87 | K87 |
| CH13 | K13 | CH38 | K38 | CH63 | K63 | CH88 | K88 |
| CH14 | K14 | CH38 | K38 | CH64 | K64 | CH89 | K89 |
| CH15 | K15 | CH40 | K40 | CH65 | K65 | CH90 | K90 |
| CH16 | K16 | CH41 | K41 | CH66 | K66 | CH91 | K91 |
| CH17 | K17 | CH42 | K42 | CH67 | K67 | CH92 | K92 |
| CH18 | K18 | CH43 | K43 | CH68 | K68 | CH93 | K93 |
| CH19 | K19 | CH44 | K44 | CH69 | K69 | CH94 | K94 |
| CH20 | K20 | CH45 | K45 | CH70 | K70 | CH95 | K95 |
| CH21 | K21 | CH46 | K46 | CH71 | K71 | CH96 | K96 |
| CH22 | K22 | CH47 | K47 | CH72 | K72 | CH97 | K97 |
| CH23 | K23 | CH48 | K48 | CH73 | K73 | CH98 | K98 |
| CH24 | K24 | CH49 | K49 | CH74 | K74 | CH99 | K99 |

3. Remove the four screws and washers, and two lead covers that secure the mezzanine board to the base board. Do not remove the hex standoffs or the base board.



4. Separate the mezzanine board from the base board.

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2570

The NI PXI-2570 is a 40-channel general-purpose relay module for the PXI platform designed for switching and controlling low-level and power signals. The NI PXI-2570 is composed of 40 <u>armature</u> latching <u>SPDT</u> relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

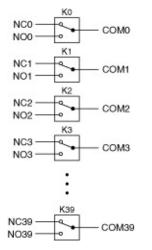
Operation Modes

The following table lists the supported topology of the NI PXI-2570 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>40-SPDT</u>	2570/40-SPDT	~	~
	(NISWITCH_TOPOLOGY_2570_40_SPDT)		

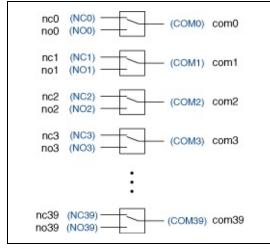
NI PXI-2570 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2570.



NI PXI-2570 40-SPDT Topology

The following figure represents the NI PXI-2570 in the 40-SPDT topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the NO terminal to the COM terminal of that channel, disconnect the NC terminal from the COM of that channel.

For example, to connect NO2 to COM2, use the following code:

```
niSwitch_Disconnect(vi, "NC2", "COM2")
```

```
niSwitch_Connect(vi, "NO2", "COM2")
```



Note To connect NO to COM you do not need to disconnect NC from COM after the module has been reset or a call to the <u>niSwitch</u> <u>Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function has been made.



Note niSwitch_Disconnect(vi, "NC2", "COM2") does not activate the relay until niSwitch_Connect(vi, "NO2", "COM2") is executed.

When scanning the NI PXI-2570, a typical scan list entry could be nc2->com2;. This entry routes the signal connected to NC2 to COM2.

Pinout

The following figure identifies the pins for the NI PXI-2570 in the 40-SPDT topology.

	-	-	1			
NC0	Ĺ		_	51 50		- COM0
NC1 149	0	75	0-	-52	- NO0	- COM1
NC2 148	0	-	•	49 53 48	- NO1	- COM2
NC3 147	٥	7	0-	54	- NO2	- COM3
NC4146	0	- 44	0	47 55 46	- NO3	- COM4
NC5 145	٥	1	0-	56	- NO4	- COM5
NC6144	0	7	0-	45 57	- NO5	- COM6
NC7 143	0	11	0-	44 58	- NO6	- COM7
NC8 142	0	٦Ľ	0	43 59	- NO7	- COM7
	0	7	0-	42 60	- NO8	
NC9	0	71	0	60 41 61	- NO9	- COM9
NG10	0	72	0	40	- NO10	- COM10
100	0	71	0	39 63	- NO11	-COM11
NG12	0	72	0	38 64	- NO12	- COM12
NO13	0	٦ſ	0-	37	- NO13	- COM13
NC14		71	0	50 36 66	- NO14	-COM14
NC15	0	٦ŗ	0	35	- NO15	- COM15
NC16 - 134	0	٦r	-	67 34	- NO16	- COM16
NC17 133	0	٦Ľ	0	68 33	- NO17	- COM17
NC18 - 132	0	٦r	0	69 32		-COM18
NC19 131	-	Ĵ	-	70	- NO18	- COM19
NC20 - 130	0	71	0	71	- NO19	- COM20
NC21 129	0		0-	72 29 73	- NO20	- COM21
NC22 128	٥	76	0-	73	- NO21	- COM22
NC23 127	0	36	0	28 74	- NO22	- COM23
NC24 126	٥	71	0-	27 75	- NO23	- COM24
NC25 125	0	1	0-	26 76	- NO24	- COM25
NC26 124	٥	7	0	25	- NO25	- COM26
NC27 123	0	99	0-	24 78	- NO26	- COM27
NC28 122	٥	7	0-	23 79	- NO27	- COM28
NC20 NC29 121	0	99	0-	22 80	- NO28	- COM28
NC30 120	0	7	0-	21 81	- NO29	- COM29
	0	7	0	20 82	- NO30	
14001	0	71	0-	19	- NO31	- COM31
NG32-117	0	71	0-	18	- NO32	- COM32
11033	0	72	0	17 85	- NO33	- COM33
NC34	0	72	0	10	- NO34	-COM34
14000	0	71	0	86 15 87	- NO35	-COM35
NC36 114	0	71	0-	14	- NO36	-COM36
NC37 113	0	71	-	88 13	- NO37	- COM37
NC38 112	0	٦ſ	0	89 12 90	- NO38	- COM38
NC39 111	0	٦r	0	90 11	- NO39	- COM39
		00			14008	

NI PXI-2570 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2570.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2570.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2570 Relay Replacement

The NI PXI-2570 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

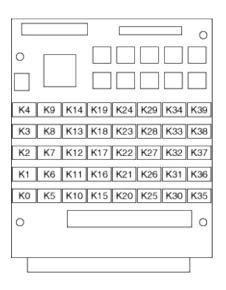
Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

Relay Kit	Part Number
National Instruments (10 relays)	779356-01

Complete the following sets of steps to disassemble your module and replace a failed relay.

Disassemble the Module

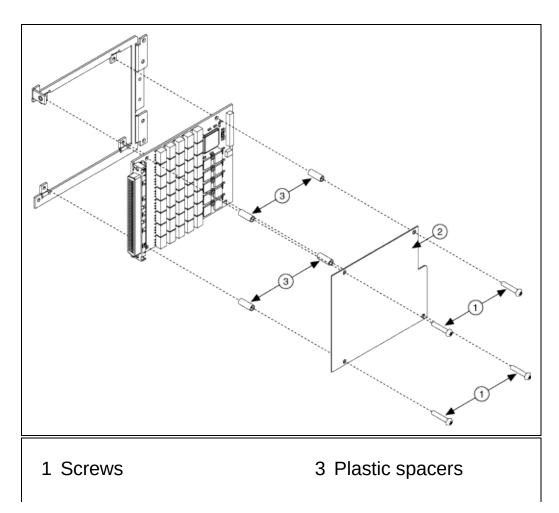
- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figure and table for relay locations.



Channel Name	Relay Name	Channel Name	Relay Name
CH0	К0	CH20	K20
CH1	K1	CH21	K21
CH3	K2	CH22	K22
CH4	K3	CH23	K23
CH5	K4	CH24	K24
CH6	K5	CH25	K25
CH7	K6	CH26	K26
CH8	K7	CH27	K27
CH8	K8	CH28	K28

CH9	К9	CH29	K29
CH10	K10	CH30	K30
CH11	K11	CH31	K31
CH12	K12	CH32	K32
CH13	K13	CH33	K33
CH14	K14	CH34	K34
CH15	K15	CH35	K35
CH16	K16	CH36	K36
CH17	K17	CH37	K37
CH18	K18	CH38	K38
CH19	K19	CH39	K39

3. Remove the four screws that secure the top-side lead cover. Retain the plastic spacers for reassembly.



2 Top-side lead cover

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Reassemble your module using the screws and the plastic spacers removed in <u>Disassemble the Module</u>, step 3.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2575

The NI PXI-2575 is a 196×1 <u>multiplexer</u> relay module for the PXI platform. The NI PXI-2575 is composed of 98 <u>SPST</u> and 1 <u>SPDT</u> <u>armature</u> latching relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

Operation Modes

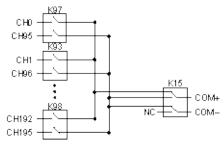
The following table lists the supported topology of the NI PXI-2575 and possible <u>operation modes</u>.

Topology	Software Name	Imn
<u>1-Wire</u> <u>196×1</u> Multiplexer	2575/1-Wire 196x1 Mux (NISWITCH_TOPOLOGY_2575_1_WIRE_196X1_MUX)	
2-Wire 98×1 Multiplexer	2575/2-Wire 98x1 Mux (NISWITCH_TOPOLOGY_2575_2_WIRE_98X1_MUX)	
2 <u>-Wire</u> 95×1 Multiplexer	2575/2-Wire 95x1 Mux (NISWITCH_TOPOLOGY_2575_2_WIRE_95X1_MUX)	
Note	When using either the SH200LFH-4xDB50F-S or	

Note When using either the SH200LFH-4xDB50F-S or SH200LFH-BARE WIRE cable with the NI PXI-2575 in the 2-wire 98×1 topology, CH95, CH96, and CH97 will have lower RF performance than the other 95 channels because they are not in twisted pairs in the cable. To avoid using these channels, NI-SWITCH has support for a 2-wire 95×1 topology that does not include CH95, CH96, and CH97.

NI PXI-2575 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2575.



The following table lists channel pairings and relay assignments for the NI PXI-2575.

1-Wire 196×1 Channel Name		2-Wire 95×1 Channel Name	2-Wire 98×1 Channel Name	Relay Number
CH0	CH95	CH0	CH0	K97
CH1	CH96	CH1	CH1	K93
CH2	CH97	CH2	CH2	K89
CH3	CH98	CH3	CH3	K85
CH4	CH99	CH4	CH4	K81
CH5	CH100	CH5	CH5	K77
CH6	CH101	CH6	CH6	K73
CH7	CH102	CH7	CH7	K69
CH8	CH103	CH8	CH8	K65
CH9	CH104	CH9	CH9	K61
CH10	CH105	CH10	CH10	K57
CH11	CH106	CH11	CH11	K53
CH12	CH107	CH12	CH12	K47
CH13	CH108	CH13	CH13	K44
CH14	CH109	CH14	CH14	K40
CH15	CH110	CH15	CH15	K39
CH16	CH111	CH16	CH16	K32
CH17	CH112	CH17	CH17	K28
CH18	CH113	CH18	CH18	K24

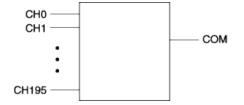
	• ·			•
CH19	CH114	CH19	CH19	K20
CH20	CH115	CH20	CH20	K16
CH21	CH116	CH21	CH21	K11
CH22	CH117	CH22	CH22	K7
CH23	CH118	CH23	CH23	K3
CH24	CH119	CH24	CH24	K52
CH25	CH120	CH25	CH25	K56
CH26	CH121	CH26	CH26	K60
CH27	CH122	CH27	CH27	K64
CH28	CH123	CH28	CH28	K68
CH29	CH124	CH29	CH29	K72
CH30	CH125	CH30	CH30	K76
CH31	CH126	CH31	CH31	K80
CH32	CH127	CH32	CH32	K84
CH33	CH128	CH33	CH33	K87
CH34	CH129	CH34	CH34	K91
CH35	CH130	CH35	CH35	K95
CH36	CH131	CH36	CH36	K2
CH37	CH132	CH37	CH37	K6
CH38	CH133	CH38	CH38	K10
CH39	CH134	CH39	CH39	K14
CH40	CH135	CH40	CH40	K19
CH41	CH136	CH41	CH41	K23
CH42	CH137	CH42	CH42	K27
CH43	CH138	CH43	CH43	K31
CH44	CH139	CH44	CH44	K35
CH45	CH140	CH45	CH45	K38
CH46	CH141	CH46	CH46	K43
CH47	CH142	CH47	CH47	K46
CH48	CH143	CH48	CH48	K96

	•			· · ·
CH49	CH144	CH49	CH49	K92
CH50	CH145	CH50	CH50	K88
CH51	CH146	CH51	CH51	K83
CH52	CH147	CH52	CH52	K79
CH53	CH148	CH53	CH53	K75
CH54	CH149	CH54	CH54	K71
CH55	CH150	CH55	CH55	K67
CH56	CH151	CH56	CH56	K63
CH57	CH152	CH57	CH57	K59
CH58	CH153	CH58	CH58	K55
CH59	CH154	CH59	CH59	K51
CH60	CH155	CH60	CH60	K45
CH61	CH156	CH61	CH61	K42
CH62	CH157	CH62	CH62	K37
CH63	CH158	CH63	CH63	K34
CH64	CH159	CH64	CH64	K30
CH65	CH160	CH65	CH65	K26
CH66	CH161	CH66	CH66	K22
CH67	CH162	CH67	CH67	K18
CH68	CH163	CH68	CH68	K13
CH69	CH164	CH69	CH69	K9
CH70	CH165	CH70	CH70	K5
CH71	CH166	CH71	CH71	K1
CH72	CH167	CH72	CH72	K50
CH73	CH168	CH73	CH73	K54
CH74	CH169	CH74	CH74	K58
CH75	CH170	CH75	CH75	K62
CH76	CH170	CH76	CH76	K66
CH77	CH172	CH77	CH77	K70
CH78	CH173	CH78	CH78	K74

011174						
CH1/4	CH79	CH79	K78			
CH175	CH80	CH80	K82			
CH176	CH81	CH81	K86			
CH177	CH82	CH82	K90			
CH178	CH83	CH83	K94			
CH179	CH84	CH84	K0			
CH180	CH85	CH85	K4			
CH181	CH86	CH86	K8			
CH182	CH87	CH87	K12			
CH183	CH88	CH88	K17			
CH184	CH89	CH89	K21			
CH185	CH90	CH90	K25			
CH186	CH91	CH91	K29			
CH187	CH92	CH92	K33			
CH188	CH93	CH93	K36			
CH189	CH94	CH94	K41			
CH193		CH95	K48			
CH194	—	CH96	K49			
CH195		CH97	K98			
COM Relay						
	CH176 CH177 CH178 CH179 CH180 CH181 CH182 CH183 CH185 CH185 CH186 CH187 CH188 CH189 CH193 CH194	CH175CH80CH176CH81CH177CH82CH178CH83CH179CH84CH180CH85CH181CH86CH182CH87CH183CH88CH184CH89CH185CH90CH186CH91CH187CH92CH188CH93CH189CH94CH193—CH194—CH195—	CH175 CH80 CH80 CH176 CH81 CH81 CH177 CH82 CH82 CH178 CH83 CH83 CH179 CH84 CH84 CH180 CH85 CH85 CH180 CH85 CH85 CH181 CH86 CH86 CH182 CH87 CH87 CH183 CH88 CH89 CH184 CH89 CH89 CH185 CH90 CH90 CH184 CH91 CH91 CH185 CH92 CH92 CH186 CH93 CH93 CH187 CH92 CH92 CH188 CH93 CH93 CH189 CH94 CH94 CH193 — CH96 CH195 — CH97			

NI PXI-2575 1-Wire 196×1 Multiplexer Topology

The following figure represents the NI PXI-2575 in the 1-wire 196×1 multiplexer topology.



Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to close the relay of channel 1, call niSwitch_Connect(vi, "ch1", "com"). To open the relay of channel 1, call niSwitch_Disconnect(vi, "ch1", "com").

When scanning the NI PXI-2575, a typical scan list entry could be ch1-com;. This entry closes the relay between CH1 and COM.

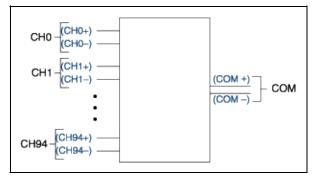
Pinout

The following figure identifies the pins for the NI PXI-2575 in the 1-wire 196×1 multiplexer topology.

				_	_	\neg					
	NO CONNECT	. 150			_		51	0	CH36		
CH84	0 CH166	151	0	6	6	0-	50 52	-0	CH131	-0	NO CONNECT
CH179	O	152	-0	9	6	0-	49 53	_	CH37	0	CH118
CH85	0	0 153 147	-0	7	6	0-	48 54	-0		0	CH23
CH180	0	0 154 	-0	J	0	0	47 55	-0	CH132	0	CH117
CH86	0	o 155 145	-0	0	6	0-	46 56	-0	CH38	0	CH22
CH181	0	0 156 144	-0]	5	0	45 57	0	CH133	0	CH116
CH87	CH69	° 157 143	-0	٦	[0	44 58	0	CH39	0	CH21
CH182	CH163	o 158 142	0	7	ŗ	0	43 59	0	CH134	-0	CH115
CH88	CH68	· 159 141	-0	7	ŗ	0	42	0	CH40	0	CH20
CH183	CH162	° 160	0	7	Γ	~	41	0	CH135	0	CH114
CH89	CH67	o 140 161	-		Γ	0	61 40	0	CH41	0	CH19
CH184	CH161	o 139 162	-	1	5	-	62 39	0	CH136	0	CH113
CH90	CH66	o 138 163	-0		ŗ	~ ~	63 38	0	CH42	0	CH18
CH185	CH160	o <u>137</u> 164	-0		ŗ	~	64 37	0	CH137		CH112
	CH65	○ 136 165			ŗ	~	65 36	0	CH43		
CH91	CH159	o 135 166	-		Г	~	66 35	0	CH138		CH17
CH186	O	o 134 167	0		ь Г	-	67 34	0	CH44	-0	CH111
CH92	0 CH158	o 133 168	0	6 	ь Г	~	68 33	0	CH139	0	CH16
CH187	CH63	o 132 0 169	0		ь Г	0-	69 32	0	CH45	0	CH110
CH93	0	 131 170 	0	٥ 	6	0	70	0	CH140	-0	CH15
CH188	0	130	0	, 	6	0	71	0	CH46	0	CH109
CH94	O	171 129	0	4	6	0	30 72	0	CH141	-0	CH14
CH189	O	172	0	6	6	0	29 73	-0	CH47	-0	CH108
COM	0	173	0	6	6	0	28 74	-0	CH142	-0	CH13
NO CONNECT	0	174	-0	6	6	0	27 75	-0	CH191	0	CH107
CH190	0	175	0	9	6	0-	26 76	-0	CH24	-0	CH12
CH72	0	176	-0	9	6	0-	25 77	-0	CH119	-0	CH194
CH167	0	177	-0	9	6	0-	24 78	0	CH25	0	CH106
CH73	0	178	-0	٦	5	0	23 79	_		0	CH11
CH168	0	° 179 121	-0	0	[0	22 80	0	CH120		CH105
CH74	0	o 180 120	-0	0	6	0-	21 81	0	CH26	0	CH10
CH169	CH152	0 181 119	-0	٦	[0	20 82	0	CH121		CH104
CH75	OH57	0 182 . 118	0	٦	[0	19 83	0	CH27	0	CH9
CH170	CH151	183 117	-0	7	[0	18 84	0	CH122		CH103
CH76	CH56	° 184 116	-0	7	[~	17 85	0	CH28		CH8
CH171	CH150	0 185 115	-0	7	5	~	16 86	0	CH123		CH102
CH77	CH55	° 186	-0	7	5	~	15	0	CH29	0	CH7
CH172	CH149	o 114 187		7	ŗ	~	87 14	0	CH124	0	CH101
CH78	CH54	113 188 112	-0	٦		0	88 13 89	0	CH30	0	СНв
CH173	CH148	° 189	0	٦		0	12	0	CH125	0	CH100
CH79	CH53	o <u>111</u> 190	-0	٦		0	90 11	0	CH31	0	CH5
CH174	CH147	o <u>110</u> 191	0	J	_	~ ~	91 10	0	CH126		CH99
CHBO	CH52	o 109 192	0		ŗ	~	92 9	0	CH32		
	CH146	o 108 193			Г		93 8	0	CH127	0	CH4
CH175	CH51	o <u>107</u> 194	0	_	ь Г	<u> </u>	94 7	0	CH33	0	CH98
CH81	o	o 106 195	0	ہ _		~	96 6	0	CH128	-0	CH3
CH176	OCH50	o 105 196	0	_	6 Г	0	96	0	CH34	-0	CH97
CH82	0	o 104 197	0	_	6	0	97 4	0	CH129	-0	CH2
CH177	0	o 103 198	0		6	~	98 3	-0	CH35	-0	CH96
CH83	0	- 102 - 199	0		6	0	99	0	CH130	-0	CH1
CH178	0	0 101	0	4	۵ ۲	~	2 100	0	CH195	-0	CH95
CH192	0	200	C	9	9	0-	1			-0	CH0
			_	-		J					

NI PXI-2575 2-Wire 95×1 Multiplexer Topology

The following figure represents the NI PXI-2575 in the 2-wire 95×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to close the relay of channel 1, call niSwitch_Connect(vi, "ch1", "com"). To open the relay of channel 1, call niSwitch_Disconnect(vi, "ch1", "com").

When scanning the NI PXI-2575, a typical scan list entry could be ch1-com;. This entry closes the relay between CH1 and COM.

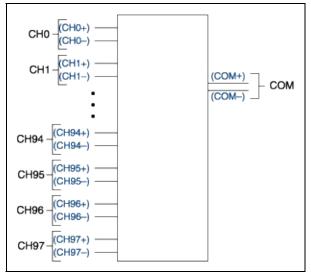
Pinout

The following figure identifies the pins for the NI PXI-2575 in the 2-wire 95×1 multiplexer topology.

	NO CONNECT	150	Ć_	51 O CH36+	
CH84+	O	151		50 52 0 CH36	NO CONNECT
CH84-	0	152		53 CH37+	CH23-
CH85+	o	163		54 0 CH37-	CH23+
CH85-	CH70+	146		55 0 CH38+	CH22-
CH86+	CH69-	145	-	46 O CH38-	CH22+
CH86-	CH69+	100	-		CH21-
CH87+	0	107			CH21+
CH87-	CH68-	142		43	CH20-
CH88+	CH68+	0 159		42 0 CH404 60 0	CH20+
CH88-	CH67-	140		41 0 CH40- 81 0	CH19-
CH89+	CH67+	139		40 0 CH41+ 62 0	CH19+
CH89-	CH66-	162		39 0 CH41- 63 0	CH18-
CH90+	CH66+	163		38 0 CH42+	CH18+
CH90-	CH65-	0 164		37 0 CH42-	CH17-
CH91+	CH65+	0 165		36 O CH43+	CH17+
CH91-	CH64-	0 166		35 0 Ch43- 67 0	CH16-
	CH64+	0 167		34 0 CH44+	CH16+
	CH63-	0 168		33 ° CH44-	CH15-
	CH63+	° 169		32 ° CH45+	CH15+
	CH62-	170		31 0 CH45-	CH14-
	CH62+	1/1		30 O CH46+	CH14+
	CH61-	1/2		29 ° CH46-	CH13-
	CH61+	173		28 O CH47+	CH13+
	CH60-	1/4		27 O CH47-	CH12-
O CONNECT	CH60+	175		26 O NO CONNECT	CH12+
	NO CONNECT	1/6		25 CH24+	NO CONNECT
	CH59-	1//		24 0 CH24-	
	CH59+	178		23 O CH25+	CH11+
	CH58-	1/8		22 ° CH25-	CH10-
	CH58+	100		21 O CH26+	
	CH57-	101		20 ° CH26-	CH9-
	CH57+	102	+ i r	19 0 CH27+	
	CH56-	103	+	18 O CH27-	CH9+ CH8-
	CH56+	o 117 184		17 O CH28+	
	CH55-	185		16 O CH28-	CH8+
CH76-	CH55+	o <u>115</u> 186		15 CH29+	CH7-
CH77+	CH54-	o <u>114</u> 187	+	14 CH29-	CH7+
CH77-	CH54+	o 113 188		13 O CH30+	CH6-
	CH53-	112		89 o CH30-	CH6+
	CH53+	111		90 O CH31+	CH5-
	CH52-	110		91 O CH31-	CH5+
	CH52+	100	- 66 -	92 o CH32+	CH4-
	CH51-	109		93 O CH32-	CH4+
	CH51+	107		94 o CH33+	CH3-
CHOTT	о	108		95 o CH33-	CH3+
	CH50+	105		96 o CH34+	CH2-
CH82+	о	. 104		97 O CH34	CH2+
CH82-	CH49+	197		96 o CH35+	CH1-
CH83+	CH48-	198		99 O CH35-	CH1+
CH83-	o	0 101		2 100 0 NO CONNECT	CH0-
NO CONNECT		200	-		CH0+
				ļ	

NI PXI-2575 2-Wire 98×1 Multiplexer Topology

The following figure represents the NI PXI-2575 in the 2-wire 98×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to close the relay of channel 1, call niSwitch_Connect(vi, "ch1", "com"). To open the relay of channel 1, call niSwitch_Disconnect(vi, "ch1", "com").

When scanning the NI PXI-2575, a typical scan list entry could be ch1-com;. This entry closes the relay between CH1 and COM.

Pinout

The following figure identifies the pins for the NI PXI-2575 in the 2-wire 98×1 multiplexer topology.

					_	_						
		. 1	150 (51		01100		
CH84+	NO CONNECT	1	151 149	-0	٦	[~	50 52	-0	CH36+	_0	NO CONNECT
CH84-	0	0 1	152 148	-0	٦	[~	49 53	-0	CH36-	_0	CH23-
CH85+	CH71+	0-1	153 147	_0	٦	[~	48 54	-0	CH37+	0	CH23+
CH85-	CH70-	0 1	154	_0		Γ	~	47	-0	CH37-	0	CH22-
CH86+	CH70+	0 1	146 155	-0		ŗ	~	55 46	-0	CH38+	0	CH22+
CH86-	CH69-		145 156		7	ŗ	~	56 45	-0	CH38-		CH21-
	CH69+		144 157	_	Ť	_	-	57 44	-0	CH39+		
CH87+	° CH68-		143 158	-0		о Г	0	58 43	-0	CH39-	0	CH21+
CH87-	0 CH68+	0	142 159	-0	0 	6 [0	59 42	-0	CH40+	-0	CH20-
CH88+	о- СН67-	<u> </u>	141	-0	6 	6	0	60 41	-0	CH40-	-0	CH20+
CH88-	O CH67+	0 1	140	-0	9	6	0	61	-0	CH41+	-0	CH19-
CH89+	о	0 1	161 139	-0	9	6	0	40 62	0	CH41-	-0	CH19+
CH89-	0		162 138	-0	9	6	0	39 63	-0	CH42+	-0	CH18-
CH90+	0		163 137	-0	9	6	0	38 64		CH42-	-0	CH18+
CH90-	0	- 1	164 136	-0]	5	0	37 65	-	CH43+	0	CH17-
CH91+	CH65+	1	165 135	-0	٦	ſ	0	36 66	-0		0	CH17+
CH91-	0	0 1	166 134	-0	٦	[~	35 67	-0	CH43-	-0	CH16-
CH92+	CH64+	0	167 133	-0]	[0	34 68	-0	CH44+	0	CH16+
CH92-	CH63-	° 1	168	_0]	[~	33	-0	CH44-	0	CH15-
CH93+	CH63+	0 1	132 169	_0		[~	69 32	-0	CH45+		CH15+
CH93-	CH62-		131 170	_0		ŗ	~	70 31	-0	CH45-		CH14-
	CH62+		130 171		7	_	-	71 30	-0	CH46+		
CH94+	0	0	129 172	-0		ہ ۲	~	72 29	-0	CH46-	-0	CH14+
CH94-	0		128 173	-0		ь Г	~	73 28	-0	CH47+	-0	CH13-
COM+	о	<u> </u>	127	-0	0 	ہ ۲	~	74 27	0	CH47-	-0	CH13+
COM-	O	0 1	126 175	-0	4	6	0	75	-0	CH96+	-0	CH12-
CH95+	о	<u> </u>	125	-0	4	6	0	26 76	-0	CH24+	-0	CH12+
CH72+	о	0 1	176 124	-0	9	6	0	25 77		CH24-	-0	CH96-
CH72-	0	_ 1	177 123	0	9	6	0	24 78	_0	CH25+	-0	CH11-
CH73+	0		178 122	-0	9	6	0	23 79		CH25-	-0	CH11+
CH73-	0	- 1	179 121	-0]	6	~	22 80	-		-0	CH10-
CH74+	0	1	180 120	-0	9	6	0	21 81	-0	CH26+	-0	CH10+
CH74-	0	0 1	181 119	-0	J	5	~	20 82	-0	CH26-	-0	CH9-
CH75+	CH57+	0 1	182	0]	5	~	19 83	0	CH27+	0	CH9+
CH75-	0	0 1	183 117	-0]	5	~	18 84	0	CH27-	0	CH8-
CH76+	CH56+	0	184	-0	7	[0	17	-0	CH28+	0	CH8+
CH76-	CH55-	0 1	116 185	-0]	5	0	85 16	-0	CH28-	0	CH7-
CH77+	CH55+	0 1	115 186	-0]		~	86 15	-0	CH29+	0	CH7+
CH77-	CH54-	0	114 187	-0	7		0	87 14	-0	CH29-	0	CH6-
CH78+	CH54+	0 1	113 188	-0	j		~	88 13	-0	CH30+		CH6+
	CH53-		112 189		-			89 12	-0	CH30-		
CH78-	O		111 190	-0	ь Т		~	90 11	-0	CH31+		CH5-
CH79+	o	0 1	110 191	-0	6 7		0	91 10	-0	CH31-	-0	CH5+
CH79-	0	0 1	109	-0	6 		0	92	-0	CH32+	-0	CH4-
CH80+	0	<u> </u>	108	-0	6 		~	93		CH32-	-0	CH4+
CH80-	0	<u>n</u> 1	193 107	-0	6	6	~	8 94	-0	CH33+	-0	CH3-
CH81+	0	0 1	194 106	-0	6	6	0	7 95	_0	CH33-	-0	CH3+
CH81-	0		195 105	-0	6	6	0	6 96		CH34+	0	CH2-
CH82+	O CH49-	. 1	196 104	-0	2	9	0	5 97		CH34-	-0	CH2+
CH82-	0	-	197 103	-0	9	6	0	4 98			-0	CH1-
CH83+	0	0 1	198 102	-0]	[0	3 99	-0	CH35+	-0	CH1+
CH83-	0	- 1	199	-0]	[~	2	-0	CH35-		CH0-
CH97+	CH48+		200	-0	7	[0	1	-0	CH97-	0	CH0+
			(_			J					

NI PXI-2575 Triggering

The NI PXI-2575 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2575.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2575.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTLO	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2575 Relay Replacement

The NI PXI-2575 uses electromechanical armature relays.

Refer to the following tables for information about ordering replacement relays.

Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

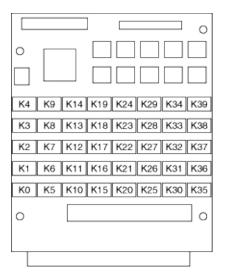
Relay Kit	Part Number
National Instruments (10 relays)	779356-01

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figures and table for relay locations.

Base Board



Mezzanine Board

							0
0				K75	K83	K91	K99
K46	K53	K60	K67	K74	K82	K90	K98
K45	K52	K59	K66	K73	K81	K89	K97
K44	K51	K58	K65	K72	K80	K88	K96
K43	K50	K57	K64	K71	K79	K87	K95
K42	K49	K56	K63	K70	K78	K86	K94
K41	K48	K55	K62	K69	K77	K85	K93
K40	K47	K54	K61	K68	K76	K84	K92
0							0

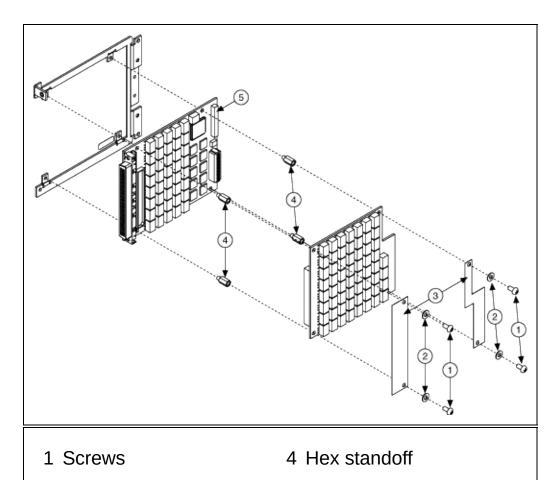
-	196×1 el Name	2-Wire 95×1 Channel Name	2-Wire 98×1 Channel Name	Relay Name
CH0_	СН95	CH0	CH0	K97
CH1	CH96	CH1	CH1	K93
CH2	CH97	CH2	CH2	K89
CH3	CH98	CH3	CH3	K85
CH4	CH99	CH4	CH4	K81
CH5	CH100	CH5	CH5	K77
CH6	CH101	CH6	CH6	K73
CH7	CH102	CH7	CH7	K69
CH8	CH103	CH8	CH8	K65
CH9	CH104	CH9	CH9	K61
CH10	CH105	CH10	CH10	K57
CH11	CH106	CH11	CH11	K53
CH12	CH107	CH12	CH12	K47
CH13	CH108	CH13	CH13	K44
CH14	CH109	CH14	CH14	K40
CH15	CH110	CH15	CH15	K39
CH16	CH111	CH16	CH16	K32
CH17	CH112	CH17	CH17	K28
CH18	CH113	CH18	CH18	K24
CH19	CH114	CH19	CH19	K20
CH20	CH115	CH20	CH20	K16
CH21	CH116	CH21	CH21	K11
CH22	CH117	CH22	CH22	K7
CH23	CH118	CH23	CH23	K3
CH24	CH119	CH24	CH24	K52
CH25	CH120	CH25	CH25	K56
CH26	CH121	CH26	CH26	K60
CH27	CH122	CH27	CH27	K64

CH28	CH123	CH28	CH28	K68
CH29	CH124	CH29	CH29	K72
CH30	CH125	CH30	CH30	K76
CH31	CH126	CH31	CH31	K80
CH32	CH127	CH32	CH32	K84
CH33	CH128	CH33	CH33	K87
CH34	CH129	CH34	CH34	K91
CH35	CH130	CH35	CH35	K95
CH36	CH131	CH36	CH36	K2
CH37	CH132	CH37	CH37	K6
CH38	CH133	CH38	CH38	K10
CH39	CH134	CH39	CH39	K14
CH40	CH135	CH40	CH40	K19
CH41	CH136	CH41	CH41	K23
CH42	CH137	CH42	CH42	K27
CH43	CH138	CH43	CH43	K31
CH44	CH139	CH44	CH44	K35
CH45	CH140	CH45	CH45	K38
CH46	CH141	CH46	CH46	K43
CH47	CH142	CH47	CH47	K46
CH48	CH143	CH48	CH48	K96
CH49	CH144	CH49	CH49	K92
CH50	CH145	CH50	CH50	K88
CH51	CH146	CH51	CH51	K83
CH52	CH147	CH52	CH52	K79
CH53	CH148	CH53	CH53	K75
CH54	CH149	CH54	CH54	K71
CH55	CH150	CH55	CH55	K67
CH56	CH151	CH56	CH56	K63
CH57	CH152	CH57	CH57	K59

CH58	CH153	CH58	CH58	K55
CH59	CH154	CH59	CH59	K51
CH60	CH155	CH60	CH60	K45
CH61	CH156	CH61	CH61	K42
CH62	CH157	CH62	CH62	K37
CH63	CH158	CH63	CH63	K34
CH64	CH159	CH64	CH64	K30
CH65	CH160	CH65	CH65	K26
CH66	CH161	CH66	CH66	K22
CH67	CH162	CH67	CH67	K18
CH68	CH163	CH68	CH68	K13
CH69	CH164	CH69	CH69	K9
CH70	CH165	CH70	CH70	K5
CH71	CH166	CH71	CH71	K1
CH72	CH167	CH72	CH72	K50
CH73	CH168	CH73	CH73	K54
CH74	CH169	CH74	CH74	K58
CH75	CH170	CH75	CH75	K62
CH76	CH170	CH76	CH76	K66
CH77	CH172	CH77	CH77	K70
CH78	CH173	CH78	CH78	K74
CH79	CH174	CH79	CH79	K78
CH80	CH175	CH80	CH80	K82
CH81	CH176	CH81	CH81	K86
CH82	CH177	CH82	CH82	K90
CH83	CH178	CH83	CH83	K94
CH84	CH179	CH84	CH84	К0
CH85	CH180	CH85	CH85	K4
CH86	CH181	CH86	CH86	K8
CH87	CH182	CH87	CH87	K12

CH88	CH183	CH88	CH88	K17
CH89	CH184	CH89	CH89	K21
CH90	CH185	CH90	CH90	K25
CH91	CH186	CH91	CH91	K29
CH92	CH187	CH92	CH92	K33
CH93	CH188	CH93	CH93	K36
CH94	CH189	CH94	CH94	K41
CH190	CH193	_	CH95	K48
CH191	CH194	_	CH96	K49
CH192	CH195		CH97	K98
COM Relay				

3. Remove the four screws and washers, and two lead covers that secure the mezzanine board to the base board. Do *not* remove the hex standoffs or the base board.



2 Washers

5 Base board

3 Lead covers

4. Separate the mezzanine board from the base board.

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2576

The NI PXI-2576 is a high-density <u>multiplexer</u> switch module for the PXI platform. The NI PXI-2576 is composed of <u>electromechanical</u> <u>armature</u> latching <u>DPST</u> relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

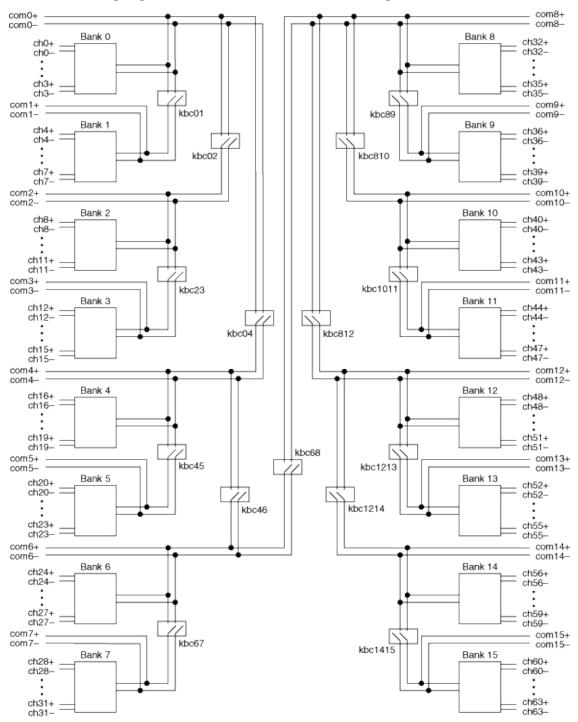
Operation Modes

The following table lists the supported topologies of the NI PXI-2576 and possible <u>operation modes</u>.

Topology	Software Name
<u>2-Wire</u> <u>Sixteen 4×1</u> <u>Multiplexer</u>	2576/2-Wire Sixteen 4x1 Mux (NISWITCH_TOPOLOGY_2576_2_WIRE_SIXTEEN_4X1_I
<u>2-Wire Octal</u> <u>8×1</u> <u>Multiplexer</u>	2576/2-Wire Octal 8x1 Mux (NISWITCH_TOPOLOGY_2576_2_WIRE_OCTAL_8X1_ML
<u>2-Wire</u> Quad 16×1 Multiplexer	2576/2-Wire Quad 16x1 Mux (NISWITCH_TOPOLOGY_2576_2_WIRE_QUAD_16X1_MI
2-Wire Dual <u>32×1</u> Multiplexer	2576/2-Wire Dual 32x1 Mux (NISWITCH_TOPOLOGY_2576_2_WIRE_DUAL_32X1_ML
<u>2-Wire 64×1</u> Multiplexer	2576/2-Wire 64x1 Mux (NISWITCH_TOPOLOGY_2576_2_WIRE_64X1_MUX)
Independent	2576/Independent (NISWITCH_TOPOLOGY_2576_INDEPENDENT)

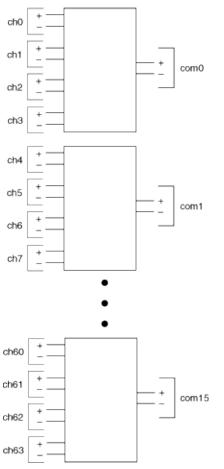
NI PXI-2576 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2576.



NI PXI-2576 2-Wire Sixteen 4×1 Multiplexer Topology

The following figure represents the NI PXI-2576 in the 2-wire sixteen 4×1 multiplexer topology.



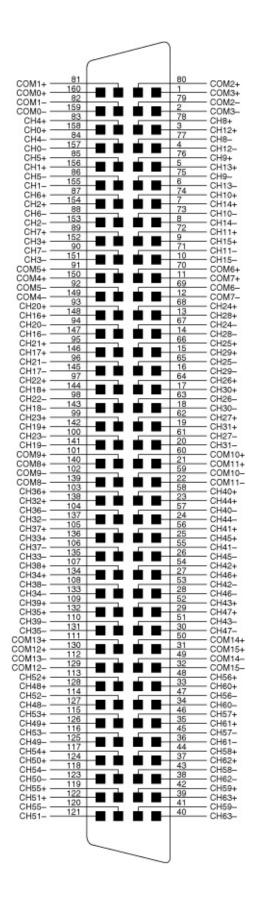
When using the NI PXI-2576 as a 2-wire sixteen 4×1 multiplexer, the positive leads of the first bank (ch0+ through ch3+) route to com0+, and the negative leads of the first bank (ch0– through ch3–) route to com0–. The pair com0+ and com0– is addressed collectively as com0 in software. All other banks follow a similar routing scheme.

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to ch2+ is routed to com0+

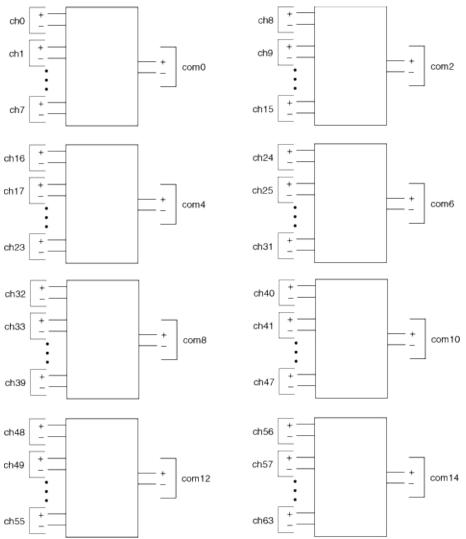
signal connected to ch2- is routed to com0-

The following figure identifies the pins for the NI PXI-2576 in the 2-wire sixteen 4×1 multiplexer topology.



NI PXI-2576 2-Wire Octal 8×1 Multiplexer Topology

The following figure represents the NI PXI-2576 in the 2-wire octal 8×1 multiplexer topology.



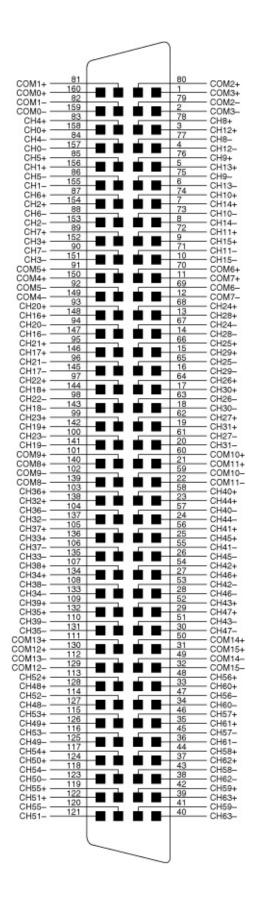
When using the NI PXI-2576 as a 2-wire octal 8×1 multiplexer, the positive leads of the first bank (ch0+ through ch7+) route to com0+, and the negative leads of the first bank (ch0– through ch7–) route to com0–. The pair com0+ and com0– is addressed collectively as com0 in software. All other banks follow a similar routing scheme.

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to ch2+ is routed to com0+

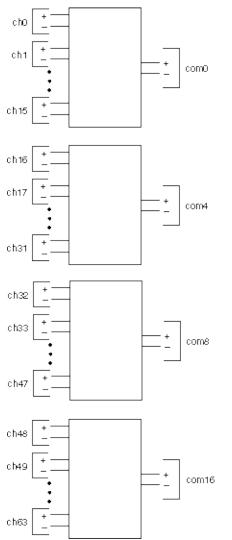
signal connected to ch2- is routed to com0-

The following figure identifies the pins for the NI PXI-2576 in the 2-wire octal 8×1 multiplexer topology.



NI PXI-2576 2-Wire Quad 16×1 Multiplexer Topology

The following figure represents the NI PXI-2576 in the 2-wire quad 16×1 multiplexer topology.



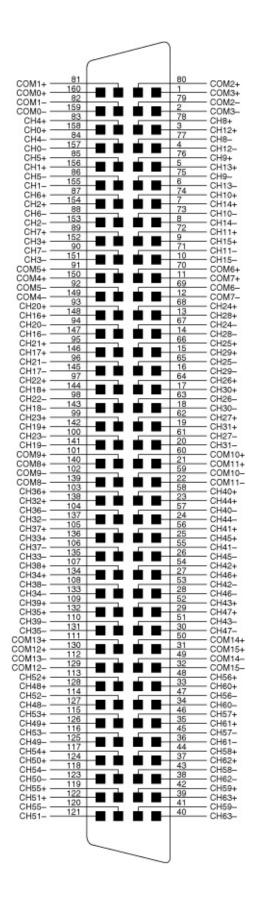
When using the NI PXI-2576 as a 2-wire quad 16×1 multiplexer, the positive leads of the first bank (ch0+ through ch15+) route to com0+, and the negative leads of the first bank (ch0– through ch15–) route to com0–. The pair com0+ and com0– is addressed collectively as com0 in software. All other banks follow a similar routing scheme.

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to ch2+ is routed to com0+

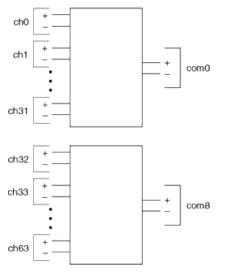
signal connected to ch2- is routed to com0-

The following figure identifies the pins for the NI PXI-2576 in the 2-wire quad 16×1 multiplexer topology.



NI PXI-2576 2-Wire Dual 32×1 Multiplexer Topology

The following figure represents the NI PXI-2576 in the $\frac{2-\text{wire}}{\text{multiplexer}}$ dual 32×1



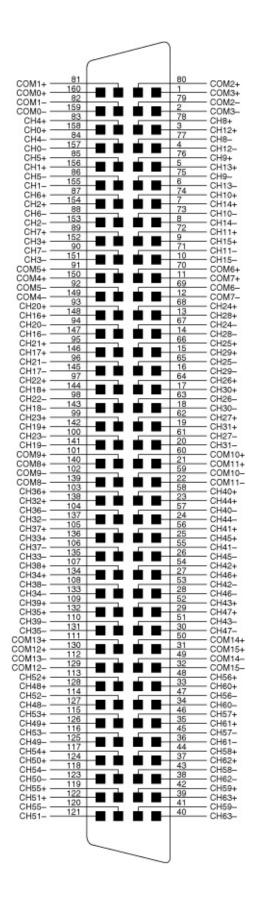
When using the NI PXI-2576 as a 2-wire dual 32×1 multiplexer, the positive leads of the first bank (ch0+ through ch31+) route to com0+, and the negative leads of the first bank (ch0– through ch31–) route to com0–. The pair com0+ and com0– is addressed collectively as com0 in software. The second bank follows a similar routing scheme.

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to ch2+ is routed to com0+

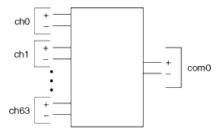
signal connected to ch2- is routed to com0-

The following figure identifies the pins for the NI PXI-2576 in the 2-wire dual 32×1 multiplexer topology.



NI PXI-2576 2-Wire 64×1 Multiplexer Topology

The following figure represents the NI PXI-2576 in the 2-wire 64×1 multiplexer topology.



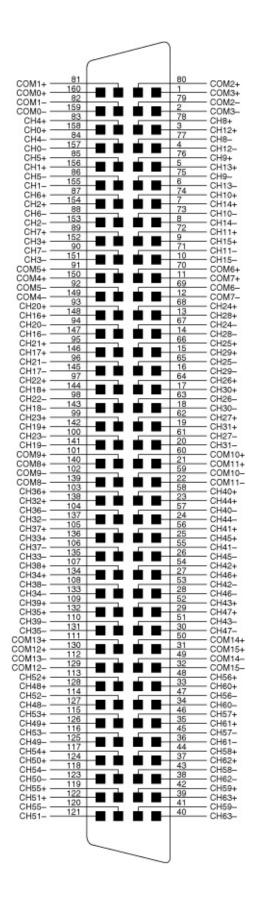
When using the NI PXI-2576 as a 2-wire 64×1 multiplexer, all positive leads (ch0+ through ch63+) route to com0+, and all negative leads (ch0– through ch63–) route to com0–. The pair com0+ and com0– is addressed collectively as com0 in software.

Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to ch2+ is routed to com0+

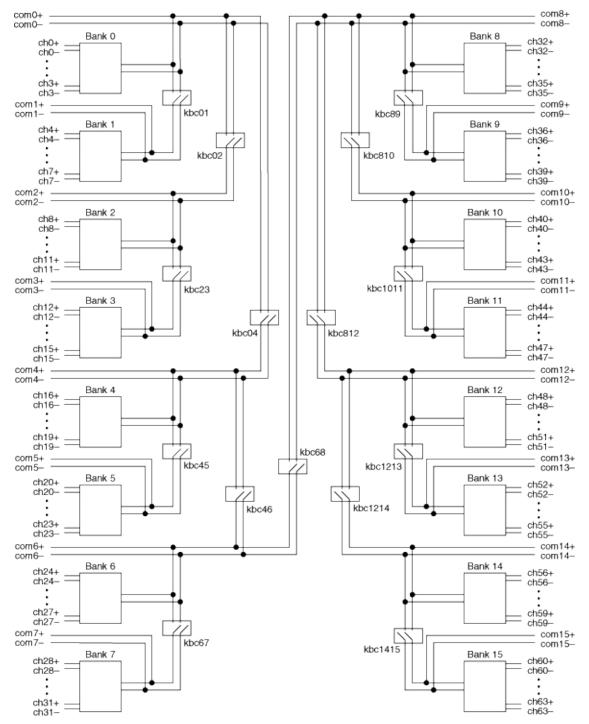
signal connected to ch2- is routed to com0-

The following figure identifies the pins for the NI PXI-2576 in the 2-wire 64×1 multiplexer topology.



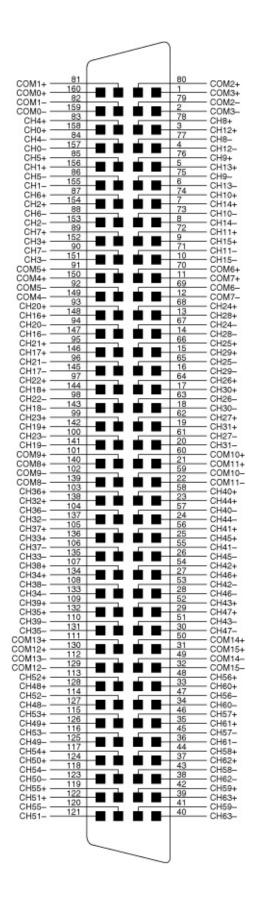
NI PXI-2576 Independent Topology

When using the NI PXI-2576 in the independent topology, connect the signals using the <u>NI TB-2676</u> terminal block. Select this topology to utilize the full routing capabilities of the NI PXI-2576. The following figure represents the NI PXI-2576 in the independent topology.



With the independent topology, you can control the individual relays using the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function, or you can use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

The following figure and table identify the pins for the NI PXI-2576 in the independent topology.



NI PXI-2576 Triggering

The NI PXI-2576 can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2576.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2576.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2576 Relay Replacement

The NI PXI-2576 uses electromechanical armature relays.

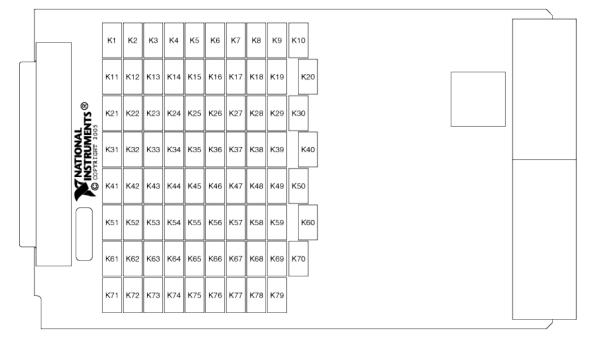
Refer to the following table for information about ordering replacement relays.

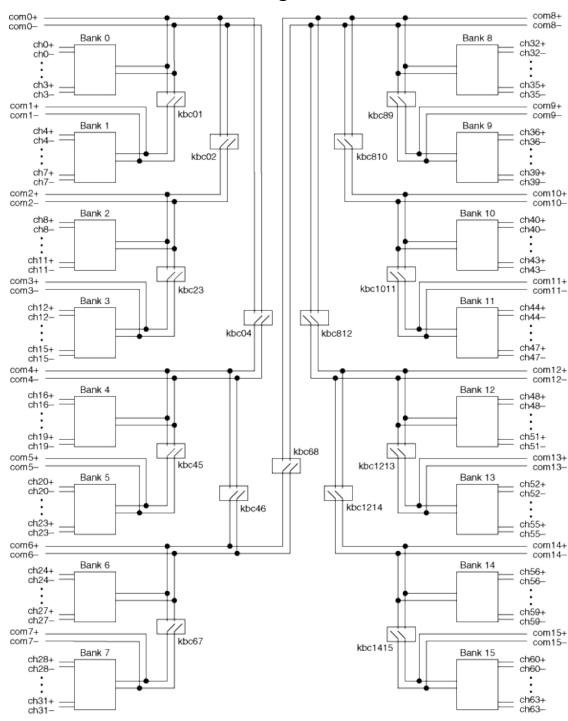
Relay Manufacturer	Part Number	
Omron	G6JU-2P-Y DC4.5	

Complete the following steps to replace a failed relay.

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Refer to the following figures and table to locate the relay you want to replace.

1. NI PXI-2576





1. NI PXI-2576 Hardware Diagram

Relay	Reference	Relay	Reference
Name	Designator	Name	Designator

k0	K6	k40	K56
k1	K7	k41	K57
k2	K8	k42	K58
k3	К9	k43	K59
k4	K1	k44	K51
k5	K2	k45	K52
k6	K3	k46	K53
k7	K4	k47	K54
k8	K16	k48	K66
k9	K17	k49	K67
k10	K18	k50	K68
k11	K19	k51	K69
k12	K11	k52	K61
k13	K12	k53	K62
k14	K13	k54	K63
k15	K14	k55	K64
k16	K26	k56	K76
k17	K27	k57	K77
k18	K28	k58	K78
k19	K29	k59	K79
k20	K21	k60	K71
k21	K22	k61	K72
k22	K23	k62	K73
k23	K24	k63	K74
k24	K36	kbc01	K5
k25	K37	kbc23	K15
k26	K38	kbc45	K25
k27	K39	kbc67	K35
k28	K31	kbc89	K45
k29	K32	kbc1011	K55
1	I		· · · · · · · · · · · · · · · · · · ·

k30	K33	kbc1213	K65
k31	K34	kbc1415	K75
k32	K46	kbc02	K10
k33	K47	kbc46	K30
k34	K48	kbc810	K50
k35	K49	kbc1214	K70
k36	K41	kbc04	K20
k37	K42	kbc812	K60
k38	K43	kbc68	K40
k39	K44		—

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Isopropyl alcohol
- Cotton swabs

Replace the relay as you would any other through-hole part.

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2584

The NI PXI-2584 is a high-voltage <u>multiplexer</u> switch module for the PXI platform. The NI PXI-2584 uses <u>reed relays</u>.

A number of factors can affect the life expectancy of reed relays. Refer to <u>Reed Relay Protection</u> for information about protecting the reed relays of the NI PXI-2584.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.

You can use the reference (REF) connections on the NI PXI-2584 to reduce noise and preserve signal integrity in 1-wire topologies. Refer to <u>Signals Connections</u> for more information about REF connections.

Operation Modes

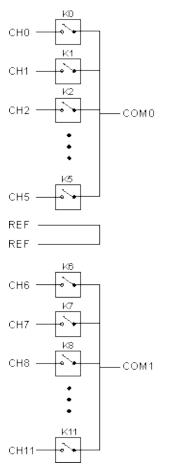
The following table lists the supported topologies of the NI PXI-2584 and possible <u>operation modes</u>.

Topology	Software Name	
<u>1-Wire Dual</u> <u>6×1</u> Multiplexer	2584/1-Wire Dual 6x1 Mux (NISWITCH_TOPOLOGY_2584_1_WIRE_DUAL_6X1_MU)	
<u>1-Wire 12×1</u> <u>Multiplexer</u>	2584/1-Wire 12x1 Mux (NISWITCH_TOPOLOGY_2584_1_WIRE_12X1_MUX)	
<u>2-Wire 6×1</u> Multiplexer	2584/2-Wire 6x1 Mux (NISWITCH_TOPOLOGY_2584_2_WIRE_6X1_MUX)	
Independent	2584/Independent (NISWITCH_TOPOLOGY_2584_INDEPENDENT)	
Tip Use the Independent topology to configure the NLPXI-2584		

Tip Use the <u>Independent</u> topology to configure the NI PXI-2584 for <u>interleaved functionality</u>. The user-implemented interleaved functionality is useful when measuring stacked signals—for example, battery stacks.

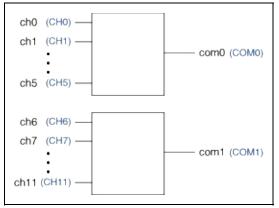
NI PXI-2584 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2584.



NI PXI-2584 1-Wire Dual 6×1 Multiplexer Topology

The following figure represents the NI PXI-2584 in the <u>1-wire</u> dual 6×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

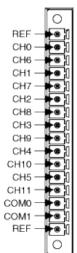
Making a Connection

Both the scanning command, $ch2 \rightarrow com0$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

Signal connected to CH2 is routed to COM0.

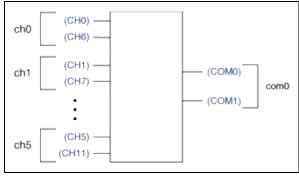
Pinout

The following figure identifies the pins for the NI PXI-2584 in the 1-wire dual 6×1 multiplexer topology.



NI PXI-2584 2-Wire 6×1 Multiplexer Topology

The following figure represents the NI PXI-2584 in the 2-wire 6×1 multiplexer topology.



Legend: Software Name (Hardware Name)

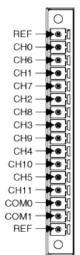
Making a Connection

Both the scanning command, $ch1 \rightarrow com0$;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch1 and com0, result in the following connections:

- Signal connected to CH1 is routed to COM0.
- Signal connected to CH7 is routed to COM1.

Pinout

The following figure and table identify the pins for the NI PXI-2584 in the in the 2-wire 6×1 multiplexer topology.

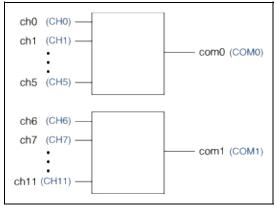


Software Name	Pin Name	
Software Name	+	Ι
ch0	CH0	CH6
ch1	CH1	CH7
ch2	CH2	CH8
ch3	CH3	CH9
ch4	CH4	CH10
ch5	CH5	CH11

NI PXI-2584 Independent Topology

Use the independent topology to utilize the full routing capabilities of the NI PXI-2584. For example, when measuring stacked signals, use the independent topology to configure the NI PXI-2584 as an <u>interleaved multiplexer</u>.

The following figure represents the NI PXI-2584 in the independent topology.



Legend: Software Name (Hardware Name)

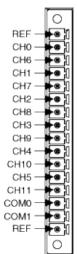
Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation, niSwitch Connect Channels VI or the niSwitch_Connect function with parameters ch2 and com0, result in the following connection:

signal connected to CH2 is routed to COM0

Pinout

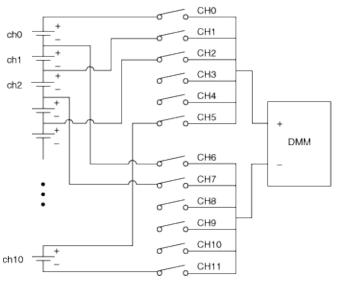
The following figure identifies the pins for the NI PXI-2584 in the independent topology.



NI PXI-2584 Interleaved Multiplexer (User-Implemented)

You can use the NI PXI-2584 independent topology to create a 2-wire 11×1 multiplexer. The independent topology interleaves the two multiplexer banks of the NI PXI-2584 to create one interleaved multiplexer. Interleaved multiplexing is useful for measuring stacked signals such as battery stacks where each channel shares a connection with the channels before and after it. By sharing connections you can nearly double the channel count while still maintaining 2-wire (differential) measurements.

A representation of an interleaved multiplexer is shown in the following figure. The channels of the interleaved multiplexer are shown on the left of the figure.



Note Signals connected to odd channels are measured in reverse polarity.

Note In multiple module operations, a *straddled channel*—an additional channel composed of the last channel of the first device (ch11) and the first channel of the second device (ch0)—is created between the two devices.

Use the <u>Independent</u> topology for both scanning and immediate operation of the NI PXI-2584 when using it as a 2-wire 11×1 interleaved multiplexer.

Single Module Scanning

In <u>single module scanning</u>, to measure signals as shown in the preceding figure, complete the following steps:

- 1. Close CH0, and CH6. The DMM measures the signal between CH0 and CH6.
- 2. Open CH0, and close CH1 (CH6 remains closed). The DMM measures the signal between CH1 and CH6, in reverse polarity.
- 3. Open CH6, and close CH7 (CH1 remains closed). The DMM measures the signal between CH1 and CH7.
- 4. Open CH1, and close CH2 (CH7 remains closed). The DMM measures the signal between CH2 and CH7, in reverse polarity.
- 5. Continue this pattern for the rest of the channels.
- 6. Open CH10, and close CH11 (CH5 remains closed). The DMM measures the signal between CH5 and CH11.

Refer to the following example for scan list syntax.

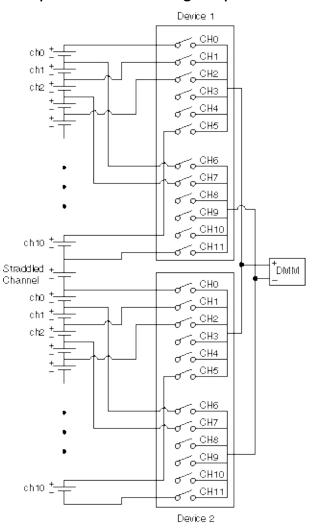
/Dev1/ch0->com0 & ch6->com1; ~ch0->com0 && ch1->com0; ~ch6->com1 && ch7->com1;...~ch10->com1 && ch11->com1; ~ch5->com0 & ~ch11->com1 &&

Note When calling the <u>niSwitch Configure Scan List</u> VI or the <u>niSwitch ConfigureScanList</u> function, select **No Action** for the **scan mode** parameter.

Refer to the NI-SWITCH or the NI-DAQmx <u>programming example</u> for more information about single module scanning with the NI PXI-2584.

Multiple Module Scanning

In <u>multiple module scanning</u>, to measure signals on multiple devices, including the straddled channel signal, as shown in the following figure, complete the following steps:



- 1. Follow the steps in <u>single module scanning</u> to measure the signals on the first device.
- 2. Open CH5 on Dev1, and close CH0 on Dev2 (CH11 on Dev1 remains closed). The DMM measures the signal between CH11 on Dev1 and CH0 on Dev2 in reverse polarity.
- 3. Open CH11 on Dev1, and close CH6 on Dev2 (CH0 on Dev2 remains closed) The DMM measures the signal between CH0 on Dev2 and CH6 on Dev2.
- 4. Open CH0 on Dev2, and close CH1 on Dev2 (CH6 on Dev2

remains closed) The DMM measures the signal between CH1 on Dev2 and CH6 on Dev2 in reverse polarity.

- 5. Open CH6 on Dev2, and close CH7 on Dev2 (CH1 on Dev2 remains closed) The DMM measures the signal between CH2 on Dev2 and CH7 on Dev2.
- 6. Continue this pattern for the rest of the channels.
- 7. Open CH10 on Dev2, and close CH11 on Dev2 (CH5 on Dev2 remains closed). The DMM measures the signal between CH5 on Dev2 and CH11 on Dev2.

Refer to the following example for scan list syntax.

/Dev1/ch0->com0 & ch6->com1; ~ch0->com0 && ch1->com0;...~ch5->com0 && /Dev2/ch0->com0; /Dev1/~ch11->com1 && /Dev2/ch6->com1; ~ch0->com0 && ch1->com0;...~ch10->com1 && ch11->com1; ~ch5->com0 & ~ch11->com1 &&

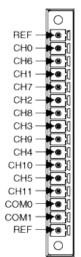


Note When calling the <u>niSwitch Configure Scan List</u> VI or the <u>niSwitch_ConfigureScanList</u> function, select **No Action** for the **scan mode** parameter.

Multiple module scanning with the NI PXI-2584 is supported *only* in NI-DAQmx. Refer to the NI-DAQmx <u>programming example</u> for more information about multiple module scanning with the NI PXI-2584.

Pinout

The following figure and table identify the pins for the NI PXI-2584 when used as a 2-wire 11×1 interleaved multiplexer.



Interleaved Channel	Pin Name	
Interleaved Charmer	+	-
ch0	CH0	CH6
ch1	CH6	CH1
ch2	CH1	CH7
ch3	CH7	CH2
ch4	CH2	CH8
ch5	CH8	CH3
ch6	CH3	CH9
ch7	CH9	CH4
ch8	CH4	CH10
ch9	CH10	CH5
ch10	CH5	CH11

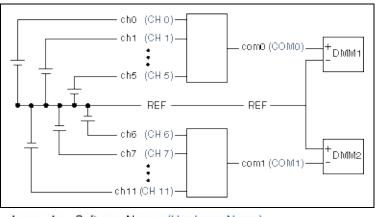
NI PXI-2584 Signal Connections

Use the two reference (REF) connections of the NI PXI-2584 to lower emissions (noise) and preserve signal integrity. The reference connections of NI PXI-2584 should be electrically connected to each other at all times and used only in 1-wire topologies.

1-Wire Dual 6×1 Multiplexer Topology

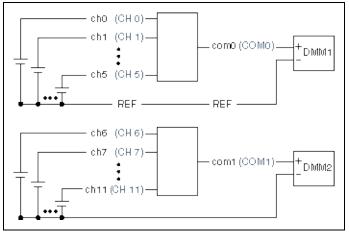
The following figures represent the NI PXI-2584 in the <u>1-wire dual 6×1</u> <u>multiplexer topology</u> using reference connections. Depending on the reference signals you want to connect, choose one of following configuration options:

• When the reference signals connected to both multiplexers are the same, connect the reference signals to REF, as shown in the following figure.



Legend: Software Name (Hardware Name)

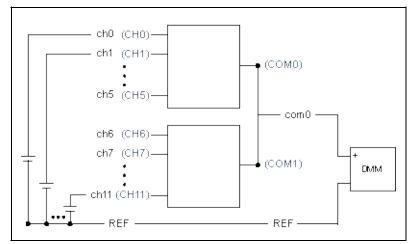
• When the reference signals connected to both multiplexers are *not* the same, connect the reference signals of one multiplexer to REF and the reference signals of the other multiplexer directly to the measurement device, as shown in the following figure.



Legend: Software Name (Hardware Name)

1-Wire 12×1 Multiplexer Topology

The following figure represents the NI PXI-2584 in the <u>1-wire 12×1</u> multiplexer topology using reference connections.



Legend: Software Name (Hardware Name)

NI PXI-2584 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2584.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2584.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2584 Relay Replacement

The NI PXI-2584 uses reed relays.

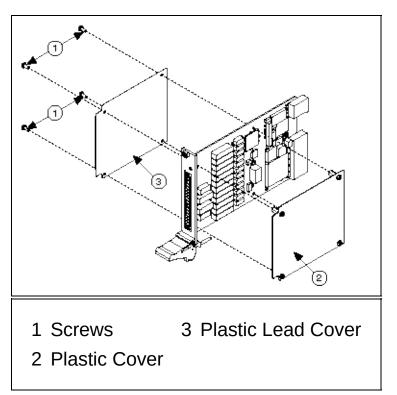
Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part
Coto Technology	9104-05-11

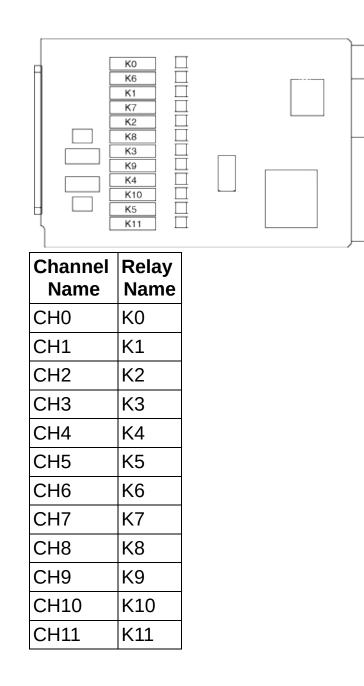
Complete the following sets of steps to disassemble your switch module, replace a failed relay, and reassemble your switch module.

Disassemble the Switch Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your switch module from electrostatic discharge.
- 2. Remove the four screws that secure the plastic cover on the top and plastic lead cover on the bottom of the switch assembly.



- 3. Carefully separate the adhered top cover absorber from the relays by slowly prying up on the cover. (Note: some metal relay caps might come loose during this process and can be put back onto the relays after you have completed relay replacement.)
- 4. Locate the relay you want to replace. Refer to the following figure and table for relay locations.



Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Isopropyl alcohol
- Cotton swabs

Replace the relay as you would any other through-hole part. Trim the replaced relay leads to under 0.05 inch protrusion.

Reassemble the Switch Module

Replace the top cover while carefully aligning the standoffs with the mounting holes in the module. Secure the bottom cover using the four screws removed in <u>Disassemble the Module</u>, step 2.

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2585

The NI PXI-2585 is a 10×1 multiplexer module for the PXI platform. The NI PXI-2585 is composed of 10 <u>SPST</u> armature nonlatching relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

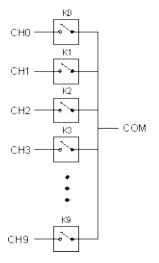
Operation Modes

The following table lists the supported topology of the NI PXI-2585 and possible <u>operation modes</u>.

Topology	Software Name	Imme
	2585/1-Wire 10x1 Mux (NISWITCH_TOPOLOGY_2585_1_WIRE_10X1_MUX)	

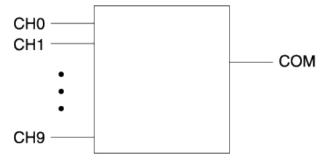
NI PXI-2585 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2586.



NI PXI-2585 1-Wire 10×1 Multiplexer Topology

The following figure represents the NI PXI-2585 in the 1-wire 10×1 multiplexer topology.



Making a Connection

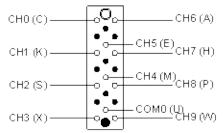
You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com").

When scanning the NI PXI-2585, a typical scan list entry could be ch_{2-} com;. This entry closes the relay between CH2 and COM.

Pinout

The following figure identifies the pins for the NI PXI-2585 in the 1-wire 10×1 multiplexer topology.



Letters in parentheses reference the pin designators of the connector.

NI PXI-2585 Triggering

The NI PXI-2585 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2585.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2585.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2585 Relay Replacement

The NI PXI-2585 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
Potter & Brumfield (Tyco Electronics)	RTB14005F (2-1419108-4)

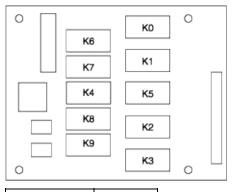
Complete the following sets of steps to disassemble your module and replace a failed relay.

Disassemble the Module

1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.



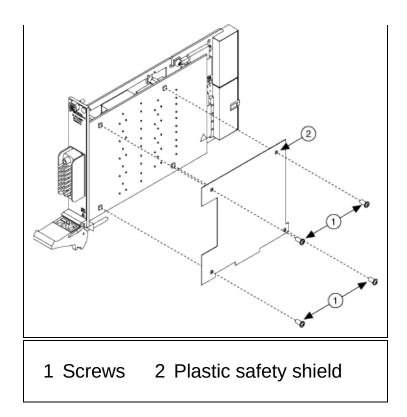
- **Note** Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figure and table for relay locations.



Channel Name	Relay Name
CH0	K0
CH1	K1
CH2	K2
CH3	K3
CH4	K4
CH5	K5
CH6	K6
CH7	K7
CH8	K8
CH9	K9

3. Remove the four screws from the back of the relay board, and carefully peel off the plastic safety shield.





Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Secure the plastic safety shield using the four screws removed in Disassemble the Module, step 3.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2586

The NI PXI-2586 is a 10-channel <u>general-purpose</u> relay module for the PXI platform designed for switching and controlling power signals. The NI PXI-2586 is composed of 10 <u>SPST</u> <u>armature</u> nonlatching relays.

For certain applications, you may need to increase the default <u>settling</u> <u>time</u>. Refer to <u>Adding Additional Settling Time</u> for more information.



Note For EMC compliance, operate this device with shielded cables.

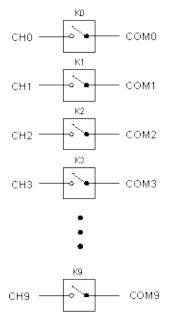
Operation Modes

The following table lists the supported topology of the NI PXI-2586 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>10-SPST</u>	2586/10-SPST	~	~
	(NISWITCH_TOPOLOGY_2586_10_SPST)		

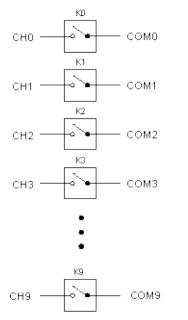
NI PXI-2586 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2586.



NI PXI-2586 10-SPST Topology

The following figure represents the NI PXI-2586 in the 10-SPST topology.



Making a Connection

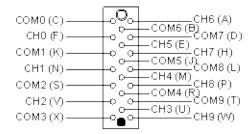
You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com2"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com2").

When scanning the NI PXI-2586, a typical scan list entry could be ch_{2-} >com₂;. This entry closes the relay between CH₂ and COM₂.

Pinout

The following figure identifies the pins for the NI PXI-2586 in the 10-SPST topology.



Letters in parentheses reference the pin designators of the connector.

NI PXI-2586 Triggering

The NI PXI-2586 can recognize trigger pulse widths less than 150 ns by <u>disabling digital filtering</u>.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2586.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2586.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2586 Relay Replacement

The NI PXI-2586 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
Potter & Brumfield (Tyco Electronics)	RTB14005F (2-1419108-4)

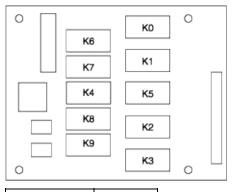
Complete the following sets of steps to disassemble your module and replace a failed relay.

Disassemble the Module

1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.



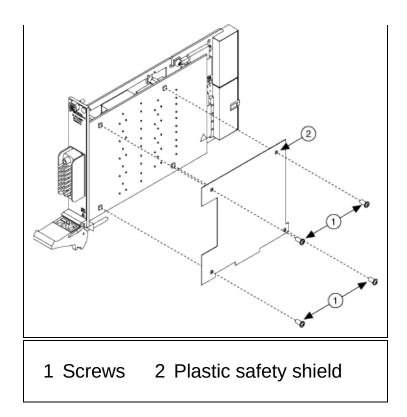
- **Note** Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Locate the relay you want to replace. Refer to the following figure and table for relay locations.



Channel Name	Relay Name
CH0	K0
CH1	K1
CH2	K2
CH3	K3
CH4	K4
CH5	K5
CH6	K6
CH7	K7
CH8	K8
CH9	K9

3. Remove the four screws from the back of the relay board, and carefully peel off the plastic safety shield.





Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Secure the plastic safety shield using the four screws removed in Disassemble the Module, step 3.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI PXI-2590

The NI PXI-2590 is a <u>multiplexer</u> switch module for the PXI bus designed to handle RF signals up to 1.3 GHz.

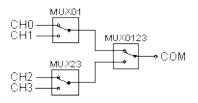
Operation Modes

The following table lists the supported topology of the NI PXI-2590 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>4×1</u>	2590/4x1 Mux	~	
Multiplexer	(NISWITCH_TOPOLOGY_2590_4X1_MUX)		

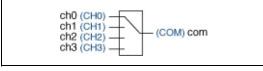
NI PXI-2590 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2590.



NI PXI-2590 4×1 Multiplexer Topology

The following figure represents the NI PXI-2590 in the 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the CH*x* terminal to the COM terminal, disconnect the previously connected terminal from the COM.

For example, to connect CH2 to COM after connecting CH1 to COM, use the following code:

```
niSwitch_Disconnect(vi, "ch1", "com")
```

```
niSwitch_Connect(vi, "ch2", "com")
```



- **Note** For an initial connection, you do not need to disconnect the default channel (ch0) from COM after the module has been reset or a call to the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch DisconnectAll</u> function has been made.
- Note niSwitch_Disconnect(vi, "ch1", "com") does not activate the relay until the niSwitch_Connect(vi, "ch2", "com") is executed. One channel of the 4x1 multiplexer is always connected to the common channel.

When scanning the NI PXI-2590, a typical scan list entry could be ch1-com;. This entry routes the signal connected to CH1 to COM.

NI PXI-2590/2591 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2590/2591.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2590/2591.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2591

The NI PXI-2591 is a <u>multiplexer</u> switch module for the PXI bus designed to handle RF signals up to 4 GHz.

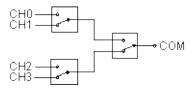
Operation Modes

The following table lists the supported topology of the NI PXI-2591 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>4×1</u>	2591/4x1 Mux	~	
<u>Multiplexer</u>	(NISWITCH_TOPOLOGY_2591_4X1_MUX)		

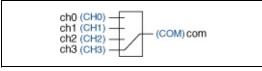
NI PXI-2591 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2591.



NI PXI-2591 4×1 Multiplexer Topology

The following figure represents the NI PXI-2591 in the 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the CH*x* terminal to the COM terminal, disconnect the previously connected terminal from the COM.

For example, to connect CH2 to COM after connecting CH1 to COM, use the following code:

```
niSwitch_Disconnect(vi, "ch1", "com")
```

```
niSwitch_Connect(vi, "ch2", "com")
```



- **Note** For an initial connection, you do not need to disconnect the default channel (ch3) from COM after the module has been reset or a call to the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch DisconnectAll</u> function has been made.
- Note niSwitch_Disconnect(vi, "ch1", "com") does not activate the relay until the niSwitch_Connect(vi, "ch2", "com") is executed. One channel of the 4x1 multiplexer is always connected to the common channel.

When scanning the NI PXI-2591, a typical scan list entry could be ch1-com;. This entry routes the signal connected to CH1 to COM.

NI PXI-2593

The NI PXI-2593 is a high-density <u>multiplexer</u> switch module for the PXI platform. The NI PXI-2593 is designed to handle RF signals up to 500 MHz.



Note For EMC compliance, operate this device with shielded cables.

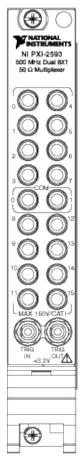
Operation Modes

The following table lists the supported topology of the NI PXI-2593 and possible <u>operation modes</u>.

Topology	Software Name
<u>Dual 8×1</u> <u>Multiplexer</u>	2593/Dual 8x1 Mux (NISWITCH_TOPOLOGY_2593_DUAL_8X1_MUX)
<u>Dual 4×1</u> <u>Terminated</u> <u>Multiplexer</u>	2593/Dual 4x1 Terminated Mux (NISWITCH_TOPOLOGY_2593_DUAL_4X1_TERMINATEI
<u>16×1</u> Multiplexer	2593/16x1 Mux (NISWITCH_TOPOLOGY_2593_16X1_MUX)
<u>8×1</u> <u>Terminated</u> <u>Multiplexer</u>	2593/8x1 Terminated Mux (NISWITCH_TOPOLOGY_2593_8X1_TERMINATED_MUX)
Independent	2593/Independent (NISWITCH_TOPOLOGY_2593_INDEPENDENT)

NI PXI-2593 Front Panel

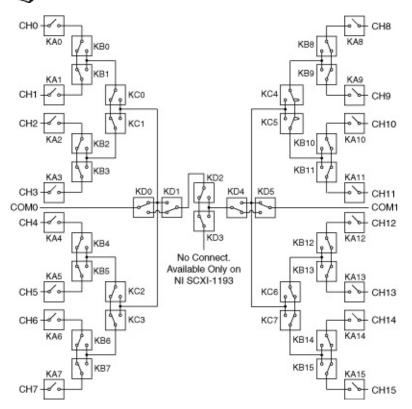
The following figure illustrates the NI PXI-2593 front panel.



NI PXI-2593 Hardware Diagram

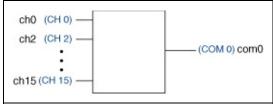
The following figure shows the hardware diagram for the NI PXI-2593.

Note Relay names are the same for every topology.



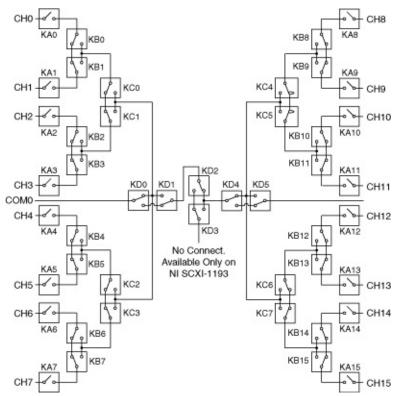
NI PXI-2593 16×1 Multiplexer Topology

The following figure represents the NI PXI-2593 16×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI PXI-2593 in the 16×1 multiplexer topology.



The NI PXI-2593 in this topology contains 16 channels connected to a common channel. These channels are referred to as ch<0..15>, and the common channel is referred to as com0. You can connect any channel to com0 in this topology.

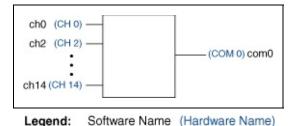
Making a Connection

You can connect the channels of the NI PXI-2593 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 15 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch15 and the **channel 2** parameter set to com0.

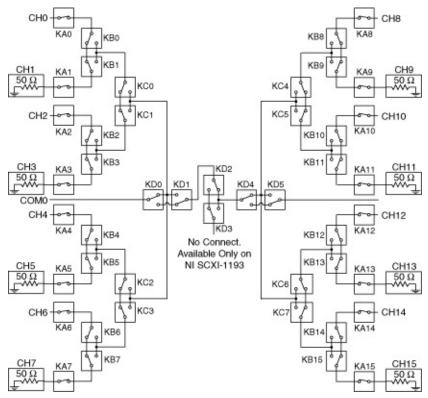
When scanning the NI PXI-2593, a typical scan list entry could be ch_{2-} >com0;. This entry routes the signal from ch2 to com0.

NI PXI-2593 8×1 Terminated Multiplexer Topology

The following figure represents the NI PXI-2593 8×1 terminated <u>multiplexer</u> topology.



The following figure shows the reset position of the NI PXI-2593 in the 8×1 terminated multiplexer topology.



For proper termination, connect an external terminator, such as the NI 50 Ω MCX terminator (778831-01), to every odd channel. Any input channel not connected to the COM is routed back to its associated termination channel.

The NI PXI-2593 in this topology contains 8 channels connected to a common channel. These channels are referred to as ch<0..14>, and the

common channel is referred to as com0. You can connect any even input channel to com0 in this topology.

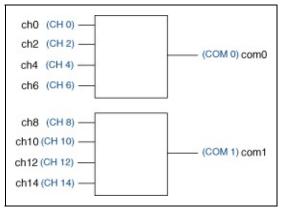
Making a Connection

You can connect the channels of the NI PXI-2593 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 14 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch14 and the **channel 2** parameter set to com0.

When scanning the NI PXI-2593, a typical scan list entry could be ch_{2-} >com0;. This entry routes signal connected to ch2 to com0.

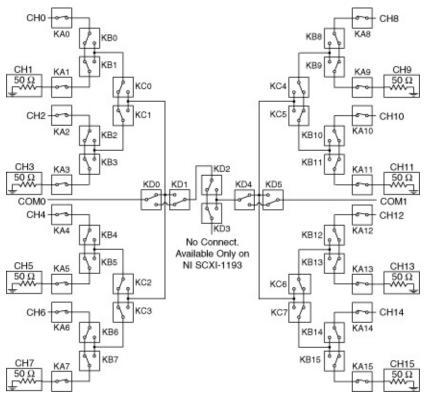
NI PXI-2593 Dual 4×1 Terminated Multiplexer Topology

The following figure represents the NI PXI-2593 dual 4×1 terminated <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI PXI-2593 in the dual 4×1 terminated <u>multiplexer</u> topology.



Making a Connection

For proper termination, connect an external terminator, such as the NI 50 Ω MCX terminator (778831-01), to every odd channel. Any input channel not connected to the COM is routed back to its associated termination channel.

The NI PXI-2593 in this topology contains two banks of four input channels connected to a common channel. These input channels are the even channels from channel 0 to channel 14. The two common channels are referred to as com0 and com1. You can only connect to the common channel that is in the same bank. The banks are organized as follows:

Input Channels	Common Channel
ch0, ch2, ch4, ch6,	com0
ch8, ch10, ch12, ch14	com1

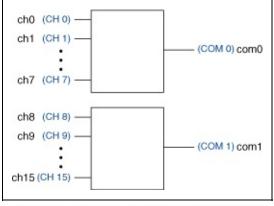
For example, you can connect ch6 to com0; however, you cannot connect ch6 to com1 in this topology.

You can connect the channels of the NI PXI-2593 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 14 to common 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch14 and the **channel 2** parameter set to com1.

When <u>scanning</u> the NI PXI-2593, a typical scan list entry could be ch2->com0;. This disconnects ch2 from its termination and route it to com0.

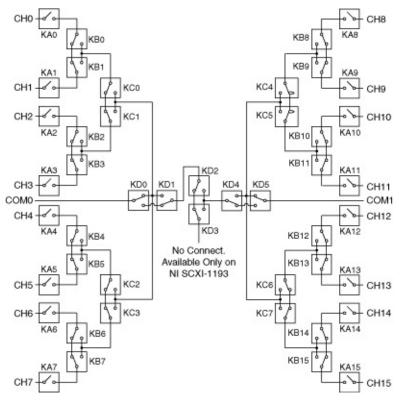
NI PXI-2593 Dual 8×1 Multiplexer Topology

The following figure represents the NI PXI-2593 dual 8×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI PXI-2593 in the dual 8×1 multiplexer topology. The reset position is the power-on configuration of the module.



Making a Connection

The NI PXI-2593 in this topology contains two banks of eight input channels connected to a common channel. These input channels are referred to as ch<0..15>, and the two common channels are referred to as com0 and com1. You can only connect to the common channel that is in the same bank. The banks are organized as follows:

Input Channels	Common Channel
ch0, ch1, ch2, ch3, ch4, ch5, ch6, ch7	com0
ch8, ch9, ch10, ch11, ch12, ch13, ch14, ch15	com1

For example, you can connect ch7 to com0; however, you cannot connect ch7 to com1 in this topology.

You can connect the channels of the NI PXI-2593 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 15 to common 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch15 and the Channel 2 parameter set to com1.

When scanning the NI PXI-2593, a typical scan list entry could be ch_{2-} >com0;. This entry routes the signal from ch2 to com0.

NI PXI-2593 Independent Topology

The NI PXI-2593 supports the independent topology, allowing you to utilize its full routing capabilities. Possible configurations include 3×1 multiplexers and dimensionally flexible sparse matrices.

Making a Connection

Control the individual relays with the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function (refer to the NI PXI-2593 <u>hardware</u> diagram for relay names). For example, to connect CH2 to COM0 on the NI PXI-2593, call the niSwitch Relay Control VI or the niSwitch_RelayControl function with **relay action** set to **Relay Closed** and **relay name** set to KA0. Repeat the call to the niSwitch Relay Control VI or the niSwitch_RelayControl function to close KB1 then KC0.

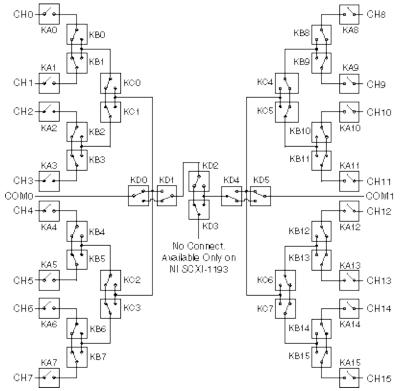
When scanning the NI PXI-2593, use the channel names in the scan list. A typical scan list entry could be $ch_{2->com_0}$;. This entry routes the signal connected to CH2 to COM0.

Valid Internal Channels

To determine the internal channel names, combine the names of all relays adjacent to a channel, in alphabetical order, and remove the K's. For example, the channel connecting KA0 and KB0 is called A0B0.

For example, to connect CH0 to COM0 using internal channel names, you need to call the following:

niSwitch_Connect (exampleSession, ch0, a0b0); niSwitch_Connect (exampleSession, a0b0, b0b1c0); niSwitch_Connect (exampleSession, b0b1c0, c0c1c2c3d0d1); niSwitch_Connect (exampleSession, c0c1c2c3d0d1, com0);



The following is a list of the valid internal channel names:

a0b0	b0b1	c0c1	ch4
a10b10	b0b1c0	c0c1c2c3d0d1	ch5
a11b11	b10b11	c2c3	ch6
a12b12	b10b11c5	c4c5	ch7
a13b13	b12b13	c4c5c6c7d4d5	ch8
a14b14	b12b13c6	c6c7	ch9

a15b15	b14b15	ch0	com0
a1b1	b14b15c7	ch10	com1
a2b2	b2b3	ch11	d0d1
a3b3	b2b3c1	ch12	d1d2
a4b4	b4b5	ch13	d2d3
a5b5	b4b5c2	ch14	d2d3d4
a6b6	b6b7	ch15	d4d5
a7b7	b6b7c3	ch1	
a8b8	b8b9	ch2	
a9b9	b8b9c4	ch3	

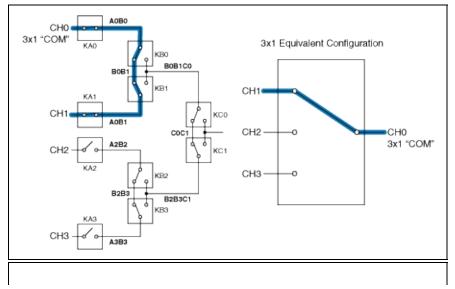
NI SCXI-1193 3×1 Multiplexers

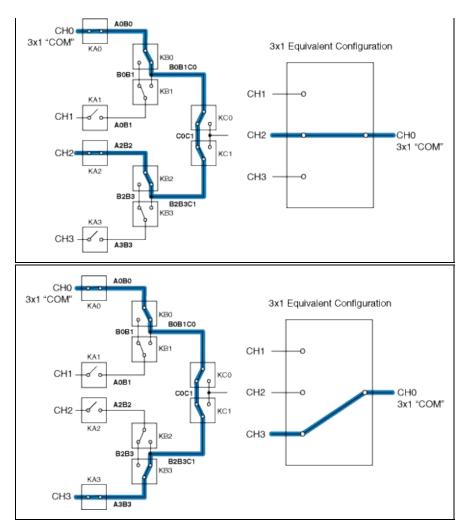
Each group of four channels (0:3, 4:7, 8:11, etc.) can be configured as independent, unterminated 3×1 <u>multiplexers</u>. Choose one channel as the "common," and route it to the other three channels.

For example, choosing CH0 as a 3×1 common, route CH1, CH2, and CH3 to it with the command options described in the following table and figure.

Route	Connect / Disconnect Calls Connection List	Individual Relay Control
CH0- > CH1	CH0->A0B0, A0B0->B0B1, B0B1->A1B1, A1B1->CH1	Close KA0, KA1 Open KB0, KB1
CH0- > CH2	CH0->A0B0, A0B0->B0B1C0, B0B1C0->C0C1, C0C1->B2B3C1, B2B3C1->A2B2, A2B2->CH2	Close KA0, KB0, KA2, KB2 Open KB1*, KB3*, KC0, KC1
CH0- > CH3	CH0->A0B0, A0B0->B0B1C0, B0B1C0->C0C1, C0C1->B2B3C1, B2B3C1->A3B3, A3B3->CH3	Close KA0, KB0, KA3, KB3 Open KB1*, KB2* KC0, KC1

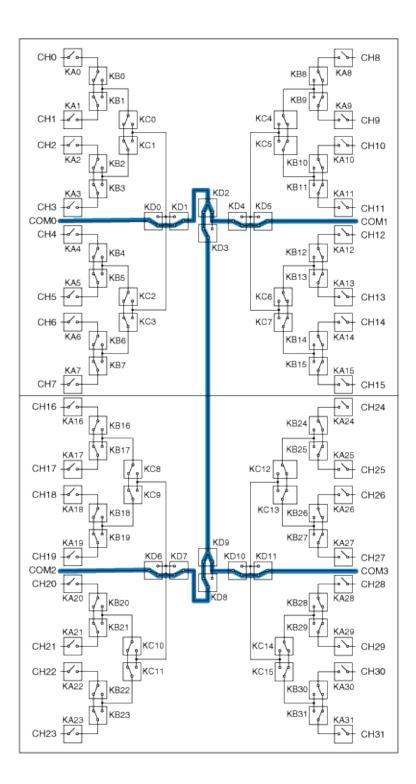
*Switch unused relays away from the signal path to improve high-frequency performance.





The NI PXI-2593 can be configured as quad 3×1 multiplexers using its 16 channels. The COM terminals are unused.

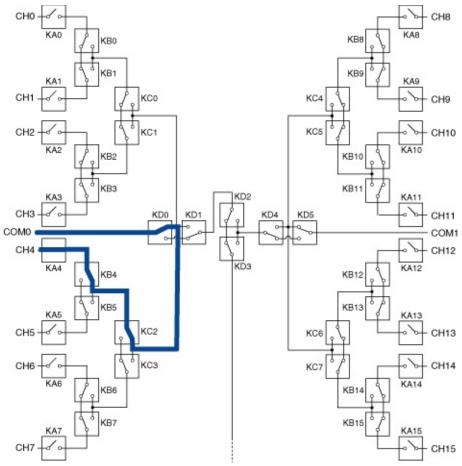
The SCXI-1193 has 32 channels that can be divided into eight 3×1 multiplexers. Additionally, the four COM terminals can route together creating a ninth 3×1 multiplexer, as shown in the following figure:



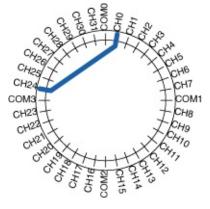
Dimensionally Flexible Sparse Matrix

The NI PXI-2593 architecture allows signals to be routed between any channel pair or common pair while maintaining >500 MHz bandwidth and minimizing RF stubs and reflections. The architecture provides more flexibility than traditional sparse matrices because the shape of the matrix is user-defined, and there is no restriction on row-to-row or column-to-column connections. For additional information about dimensionally flexible sparse matrices, refer to the NI Developer Zone document, *Advanced Signal Routing with the NI PXI-2593 and NI SCXI-1193 RF Switches* at ni.com/zone.

Routing Configuration



Equivalent Representation



NI PXI-2593 Triggering

This module can recognize trigger pulse widths less than 150 ns by disabling digital filtering.

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2593.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG IN of the front panel

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2593.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTLO	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Front Connector	External (NISWITCH_VAL_EXTERNAL)	TRIG OUT on front panel

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2594/2595

The NI PXI-2594 and the NI PXI-2595 are <u>multiplexer</u> switch modules for the PXI bus designed to handle RF signals up to 2.5 GHz (NI PXI-2594) and 5 GHz (NI PXI-2595).



Note For EMC compliance, operate this device with shielded cables.

NI PXI-2594 Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2594 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Sca
<u>4×1</u>	2594/4x1 Mux	~	
Multiplexer	(NISWITCH_TOPOLOGY_2594_4X1_MUX)		

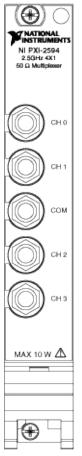
NI PXI-2595 Operation Modes

The following table lists the supported <u>topology</u> of the NI PXI-2595 and possible <u>operation modes</u>.

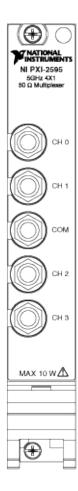
Topology	Software Name	Immediate	Sca
<u>4×1</u>	2595/4x1 Mux	~	
Multiplexer	(NISWITCH_TOPOLOGY_2595_4X1_MUX)		

NI PXI-2594/2595 Front Panels

The following figure illustrates the NI PXI-2594 front panel.

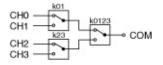


The following figure illustrates the NI PXI-2595 front panel.



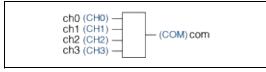
NI PXI-2594/2595 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2594/2595.



NI PXI-2594/2595 4×1 Multiplexer Topology

The following figure represents the NI PXI-2594/2595 in the 4×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect ch1 to com, call niSwitch_Connect (vi, "ch1", "com"). If you now want to connect ch2 to com, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect(vi, "ch1", "com")
```

```
niSwitch_Connect(vi, "ch2", "com")
```



Note niSwitch_Disconnect(vi, "ch1", "com") does not operate the relay until the niSwitch_Connect(vi, "ch2", "com") is executed. One channel of the 4x1 multiplexer is always connected to the common channel.



Note For an initial connection, you do not need to disconnect the default channel (ch0) from COM after the module has been reset or a call to the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function has been made.

When scanning the NI PXI-2594/2595, a typical scan list entry could be ch1->com;. This entry routes the signal connected to CH1 to COM.

NI PXI-2594/2595 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2594/2595.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2594/2595.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2596

The NI PXI-2596 is a <u>multiplexer</u> switch module for the PXI bus designed to handle RF signals up to 26.5 GHz.

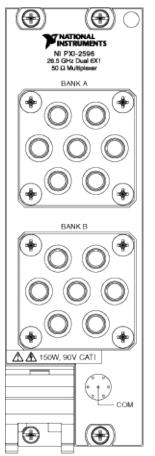
Operation Modes

The following table lists the supported topology of the NI PXI-2596 and possible <u>operation modes</u>.

Topology	Software Name	Immedia
<u>Dual 6×1</u>	2596/Dual 6×1 Mux	~
Multiplexer	(NISWITCH_TOPOLOGY_2596_DUAL_6×1_MUX)	

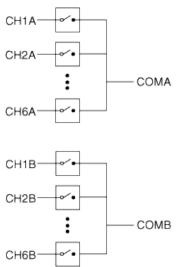
NI PXI-2596 Front Panel

The following figure illustrates the NI PXI-2596 front panel.



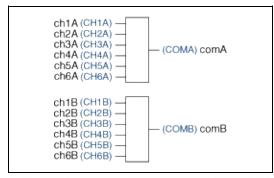
NI PXI-2596 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2596.



NI PXI-2596 Dual 6×1 Multiplexer Topology

The following figure represents the NI PXI-2596 in the dual 6×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the CH*nx* terminal to the COM*x* terminal, disconnect the previously connected terminal from the COM*x*.

For example, to connect ch1A to comA, call niSwitch_Connect (vi, "ch1A", "comA"). If you now want to connect ch2A to comA, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect (vi, "ch1A", "comA")
niSwitch_Connect (vi, "ch2A", "comA")
```



Note All channels are disconnected from COM when the NI PXI-2596 is in its power on state.

When scanning the NI PXI-2596, a typical scan list entry could be ch1A->comA;. This entry routes the signal connected to CH1A to COMA.

NI PXI-2596 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2596.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2596.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2597

The NI PXI-2597 is a terminated <u>multiplexer</u> switch module for the PXI bus designed to handle RF signals up to 26.5 GHz.

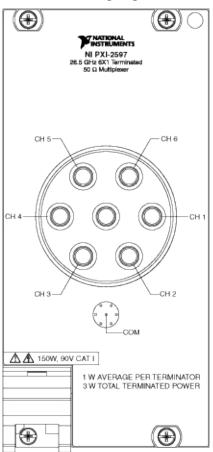
Operation Modes

The following table lists the supported topology of the NI PXI-2597 and possible <u>operation modes</u>.

Topology	Software Name
	2597/6×1 Terminated Mux (NISWITCH_TOPOLOGY_2597_6×1_TERMINATED_MUX)

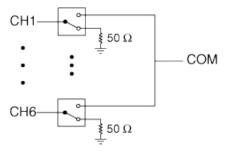
NI PXI-2597 Front Panel

The following figure illustrates the NI PXI-2597 front panel.



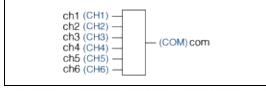
NI PXI-2597 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2597.



NI PXI-2597 6×1 Terminated Multiplexer Topology

The following figure represents the NI PXI-2597 in the 6×1 terminated multiplexer topology.



Legend: Software Name (Hardware Name)



Caution The terminators on the NI PXI-2597 are rated for 1 W average power at 25 °C, with power on all terminators not to exceed 3 W. Terminators *cannot* withstand the full rated power of the NI PXI-2597.

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the CH*x* terminal to the COM terminal, disconnect the previously connected terminal from the COM.

For example, to connect ch1 to com, call niSwitch_Connect (vi, "ch1", "com"). If you now want to connect ch2 to com, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect (vi, "ch1", "com")
niSwitch_Connect (vi, "ch2", "com")
```



Note Any input channel *not* connected to COM is connected to its associated 50 Ω terminator.



Note All channels are disconnected from COM when the NI PXI-2597 is in its power on state.

When scanning the NI PXI-2597, a typical scan list entry could be ch_{2-} com;. This entry routes signal connected to ch_{2} to com.

NI PXI-2597 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2597.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2597.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2598

The NI PXI-2598 is an 2-channel, <u>transfer switch</u> module for the PXI platform designed to handle <u>RF signals</u> up to 26.5 GHz. The NI PXI-2598 is composed of <u>transfer switch</u> relays.

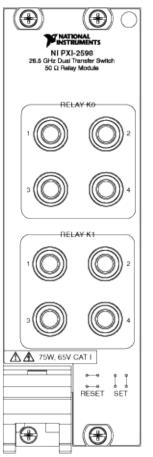
Operation Modes

The following table lists the supported topology of the NI PXI-2598 and possible <u>operation modes</u>.

Topology	Software Name	Immedi
<u>Dual</u>	2598/Dual Transfer	~
<u>Transfer</u>	(NISWITCH_TOPOLOGY_2598_DUAL_TRANSFER)	

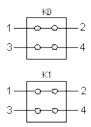
NI PXI-2598 Front Panel

The following figure illustrates the NI PXI-2598 front panel.



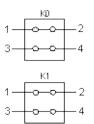
NI PXI-2598 Hardware Diagram

The following figures show the hardware diagram for the NI PXI-2598.

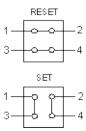


NI PXI-2598 Dual Transfer Switch Topology

The following figures represents the NI PXI-2598 in the dual <u>transfer</u> <u>switch</u> topology.



The following figures show the two states of a transfer switch, reset and set.



Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To set the transfer switch, disconnect the nc terminal from com, and connect no to com.

For example, to set the transfer switch K0, use the following code:

```
niSwitch_Disconnect(vi, "nc0", "com0")
```

```
niSwitch_Connect(vi, "no0", "com0")
```



Note To connect no to com you do not need to disconnect nc from com after the module has been reset or a call to the <u>niSwitch</u>
 <u>Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function has been made.

N

Note niSwitch_Disconnect(vi, "nc0", "com0") does *not* operate the relay until niSwitch_Connect(vi, "no0", "com0") is executed. Similarly, niSwitch_Disconnect(vi, "no0", "com0") does *not* operate the relay until niSwitch_Connect(vi, "nc0", "com0") is executed.

To reset the transfer switch, disconnect the no terminal from com, and connect nc to com.

For example, to reset the transfer switch K0, use the following code:

```
niSwitch_Disconnect(vi, "no0", "com0")
```

```
niSwitch_Connect(vi, "nc0", "com0")
```

When scanning the NI PXI-2598, a typical scan list entry could be nc0->com0;. This entry resets transfer switch K0.

NI PXI-2598 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2598.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2598.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI PXI-2599

The NI PXI-2599 is an 2-channel, <u>general-purpose</u> switch module for the PXI platform designed to handle <u>RF signals</u> up to 26.5 GHz. The NI PXI-2599 is composed of <u>2-SPDT</u> relays.

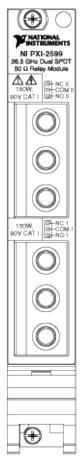
Operation Modes

The following table lists the supported topology of the NI PXI-2599 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scann
2-SPDT	2599/2-SPDT	~	~
	(NISWITCH_TOPOLOGY_2599_2_SPDT)		

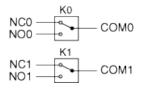
NI PXI-2599 Front Panel

The following figure illustrates the NI PXI-2599 front panel.



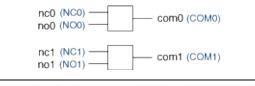
NI PXI-2599 Hardware Diagram

The following figure shows the hardware diagram for the NI PXI-2599.



NI PXI-2599 2-SPDT Topology

The following figure represents the NI PXI-2599 in the 2-SPDT generalpurpose topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect the NO terminal of channel 1 to the COM terminal of channel 1, call niSwitch_Connect (vi, "no1", "com1"). If you now want to connect NC1 to COM1, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect(vi, "no1", "com1")
```

```
niSwitch_Connect(vi, "nc1", "com1")
```

- Note niSwitch_Disconnect(vi, "no1", "com1") does not operate the relay until the niSwitch_Connect(vi, "nc1", "com1") is executed.
- $\overline{\mathbb{N}}$

Note For an initial connection, you do not need to disconnect the default channel (ncx) from COM after the module has been reset or a call to the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch DisconnectAll</u> function has been made.

When scanning the NI PXI-2599, a typical scan list entry could be nc1-com1;. This entry routes the signal connected to NC1 to COM1.

NI PXI-2599 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI PXI-2599.

Trigger Input	Software	Hardware
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI PXI-2599.

Scan Advanced Output	Software	Hardware
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	PXI trigger line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	PXI trigger line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	PXI trigger line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	PXI trigger line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	PXI trigger line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	PXI trigger line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	PXI trigger line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	PXI trigger line 7

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1127/1128

The NI SCXI-1127 and the NI SCXI-1128 are high-density, high-voltage multiplexer/matrix modules for the SCXI platform. The NI SCXI-1127 is composed of armature relays, and the NI SCXI-1128 uses solid-state relays. The NI SCXI-1127/1128 support routing signals to the high-voltage analog bus.



Note For EMC compliance, operate this device with shielded cables.

Notes The NI SCXI-1127/1128 only support <u>continuous scanning</u>.

If you configure the NI SCXI-1127/1128 as a Traditional NI-DAQ (Legacy) Device, you can only select the 2-wire 32×1 multiplexer, 2-wire 4×8 matrix, and independent topologies. To use the NI SCXI-1127/1128 as 1-wire, 2-wire, and 4-wire multiplexer, select the 2-wire 32×1 multiplexer topology and configure all channels appropriately in Measurement and Automation Explorer (MAX).

NI SCXI-1127 Operation Modes

The following table lists the supported <u>topologies</u> of the NI SCXI-1127 and possible <u>operation modes</u>.

Topology	Software Name	Ir
<u>1-Wire 64×1</u> <u>Multiplexer</u>	1127/1-Wire 64x1 Mux (NISWITCH_TOPOLOGY_1127_1_WIRE_64X1_MUX)	
<u>2-Wire 32×1</u> <u>Multiplexer</u>	1127/2-Wire 32x1 Mux (NISWITCH_TOPOLOGY_1127_2_WIRE_32X1_MUX)	
<u>4-Wire 16×1</u> <u>Multiplexer</u>	1127/4-Wire 16x1 Mux (NISWITCH_TOPOLOGY_1127_4_WIRE_16X1_MUX)	
<u>2-Wire 4×8</u> <u>Matrix</u>	1127/2-Wire 4x8 Matrix (NISWITCH_TOPOLOGY_1127_2_WIRE_4X8_MATRIX)	
Independent	1127/Independent (NISWITCH_TOPOLOGY_1127_INDEPENDENT)	

NI SCXI-1128 Operation Modes

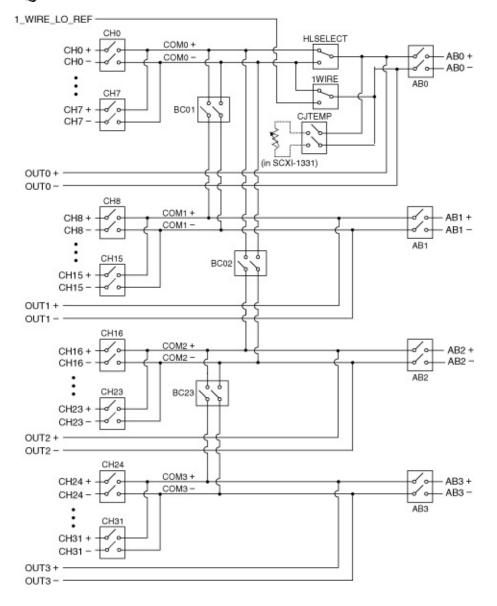
The following table lists the supported topologies of the NI SCXI-1128 and possible operation modes.

Topology	Software Name	Ir
<u>1-Wire 64×1</u> <u>Multiplexer</u>	1128/1-Wire 64x1 Mux (NISWITCH_TOPOLOGY_1128_1_WIRE_64X1_MUX)	
<u>2-Wire 32×1</u> <u>Multiplexer</u>	1128/2-Wire 32x1 Mux (NISWITCH_TOPOLOGY_1128_2_WIRE_32X1_MUX)	
<u>4-Wire 16×1</u> <u>Multiplexer</u>	1128/4-Wire 16x1 Mux (NISWITCH_TOPOLOGY_1128_4_WIRE_16X1_MUX)	
<u>2-Wire 4×8</u> <u>Matrix</u>	1128/2-Wire 4x8 Matrix (NISWITCH_TOPOLOGY_1128_2_WIRE_4X8_MATRIX)	
Independent	1128/Independent (NISWITCH_TOPOLOGY_1128_INDEPENDENT)	

NI SCXI-1127/1128 Hardware Diagram

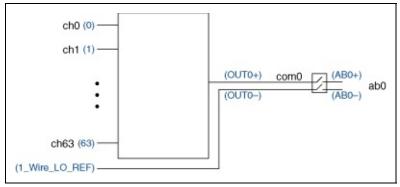
The following figure shows the hardware diagram for the NI SCXI-1127/1128.

Note Relay names are the same for every topology.



NI SCXI-1127/1128 1-Wire 64×1 Multiplexer Topology

When using the NI SCXI-1127/1128 as a <u>1-wire</u> 64×1 <u>multiplexer</u>, connect your signals using the <u>NI SCXI-1331</u> terminal block. In this topology, use the line labeled 1_WIRE_LO_REF inside the NI SCXI-1331 terminal block as the common reference. The following figure represents the NI SCXI-1127/1128 in the 1-wire 64×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

Each signal is routed through the NI SCXI-1127/1128 and is available on OUT0+ screw terminals on the NI SCXI-1331 terminal block, and the reference signal connected to 1_WIRE_LO_REF is routed to the OUT0- screw terminal. You can further route both signal OUT0+ and OUT0- to high-voltage analog bus AB0+ and AB0-, respectively.

During <u>scanning</u>, a typical <u>scan list</u> entry is ch2->com0;. This entry routes the signal connected to ch2 to OUT0+ and signals connected to 1_WIRE_LO_REF to OUT0-. By default, this scan list entry will also route OUT0+ and OUT0- to AB0+ and AB0-.

When using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with ch2 and com0 during <u>immediate operations</u>, the signal connected to ch2 is routed to OUT0+, and the signal connected to 1_WIRE_LO_REF is routed to OUT0–. To route OUT0+ and OUT0– to AB0+ and AB0–, use the niSwitch Connect Channels VI with com0 and ab0.

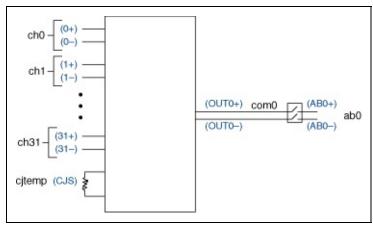
Pinout

The following figure identifies the pins for the NI SCXI-1127/1128 in the 1wire 64×1 multiplexer topology.

Pin Number	Signal Name	Column A B C			Signal Name
		-			
	0.14		Ľ	-	CH32
32	CH2	+•		0	CH0
31	CH34	\rightarrow	۲.	0	CH33 CH1
	12430-5				CH35
30	CH5	+•	ſ	<u> </u>	CH3
29	CH37	\rightarrow	Ľ	-	CH36 CH4
					CH38
28	CH8	+•	ſ	0	CH6
27	CH40		ſ	0	CH39 CH7
			Ľ		CH41
26	CH11	+•		<u> </u>	CH9 CH42
25	CH43		۲.	-	CH10
~			Ľ	-	CH44
24	CH14	+•		0	CH12 CH45
23	CH46	$+ \circ$	ſ	<u> </u>	CH13
22	CH17		Ľ	-	CH47 CH15
22	Uni/	- V	_	-	CH48
21	CH49	+•	Ŷ	-	CH16
20	CH20	-	Ľ	~	CH50 CH18
20	01/20	Ĩ			CH51
19	CH52	+•	ſ	-	CH19
18	CH23	-	Ľ	-	CH53 CH21
			Ľ		CH54
17	CH55	+•	0	°	CH22 CH56
16	CH26		ſ	0	CH24
			Ľ		CH57
15	CH58	+•		•	CH25 CH59
14	CH29	+-•	ſ	0	CH27
	01104		Ľ	-	CH60
13	CH61	T			CH28 CH62
12	OUT0+	+•	ſ	0	CH30
11	OUT0-	-	Ľ	-	CH63 CH31
	0010-	ľ	_	-	OUT1- (CH40-CH47)
10	OUT3+ (CH24-CH31)	+•	Ŷ	-	OUT1+ (CH8-CH15)
9	OUT3- (CH56-CH63)	-	Ľ	~	OUT2- (CH48-CH55) OUT2+ (CH16-CH23)
					CJS-
8	CJS-	+•	ſ	0	CJS+ 1_WIRE_LO_REF
7	+5 V (ISO)		Ľ	-	+5 V (ISO)_HVAB_EN
	100 CO. 4 CO. 4		Ľ	_	NC
6	NC	+•	0	<u> </u>	NC NC
5	NC	+-•	6	0	NC
	10		Ľ	-	NC NC
4	NC	T	- C.		NC
3	NC	+•	Ŷ	0	NC
2	Reserved	\rightarrow	Ľ	-	NC NC
2		Ĩ			EXT_TRIG_IN
1	SCANADVD	-0	ſ	0	GND (Non-Isolated)

NI SCXI-1127/1128 2-Wire 32×1 Multiplexer Topology

When using the NI SCXI-1127/1128 as a 2-wire 32×1 multiplexer, connect your signals using the NI SCXI-1331 terminal block. In this topology, use the screw terminal labeled 2W inside the NI SCXI-1331 terminal block. The following figure represents the NI SCXI-1127/1128 in the 2-wire 32×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

In 2-wire mode, all signals have two differential leads and connect to the NI SCXI-1331 on X+ and X-. Each signal pair is routed through the NI SCXI-1127/1128 and is available on OUT0+ and OUT0- screw terminals on the NI SCXI-1331 terminal block. You can further route both signals, OUT0+ and OUT0-, to high-voltage analog bus AB0+ and AB0-, respectively.

During scanning, a typical scan list entry is ch2->com0;. This entry routes the signal connected to 2+ and 2- to OUT0+ and OUT0- respectively. By default, this scan list entry will also route OUT0+ and OUT0- to AB0+ and AB0-.

When using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with ch2 and com0 during <u>immediate operations</u>, the signal connected to 2+ and 2- are routed to OUT0+ and OUT0- respectively. To route OUT0+ and OUT0- to AB0+ and AB0-, use the niSwitch Connect Channels VI or the niSwitch_Connect function with com0 and ab0.

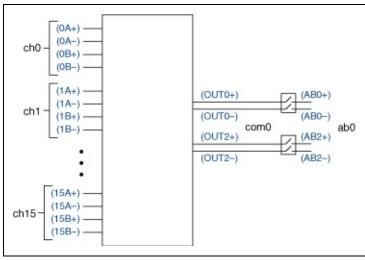
Pinout

The following figure identifies the pins for the NI SCXI-1127/1128 in the 2wire 32×1 multiplexer topology.

Pin Number	Signal Name	Column A B C			Signal Name
					CH0-
32	CH2+	+•	Ŷ	-	CH0+
31	CH2-		Ľ	~	CH1-
31	012-			-	CH1+ CH3-
30	CH5+	+-0	P	0	CH3+
	OUE	-	Ľ	-	CH4-
29	CH5-	10		•	CH4+ CH6-
28	CH8+		5	-	CH6+
			Ľ	-	CH7-
27	CH8-	+•	0	-	CH7+
26	CH11+		Ľ	0	CH9- CH9+
				-	CH10-
25	CH11-	+•	Ŷ	0	CH10+
24	CH14+		Ľ	0	CH12- CH12+
24	Onit	- C		-	CH13-
23	CH14-	-0	P	0	CH13+
~~	01147		Ľ		CH15-
22	CH17+	+•		•	CH15+ CH16-
21	CH17-	-0	Ŷ	0	CH16+
	0000000000		Ľ		CH18-
20	CH20+	+•	0	<u> </u>	CH18+
19	CH20-	-0	5	0	CH19- CH19+
10	01120		_	-	CH21-
18	CH23+	-0	6	0	CH21+
17	CH23-		Ľ	~	CH22- CH22+
17	0123-	T	1.1	~	CH22+
16	CH26+		Ŷ	-	CH24+
45	01100	1	Ľ	-	CH25-
15	CH26-	T			CH25+ CH27-
14	CH29+		6	-	CH27+
10000			Ľ	-	CH28-
13	CH29-	+•		•	CH28+ CH30-
12	OUT0+		5	0	CH30+
		~			CH31-
11	OUT0-	+•	Ŷ	0	CH31+
10	OUT3+	<u> </u>	Ľ	~	OUT1- OUT1+
10	00101		_		OUT2-
9	OUT3-	-	9	0	OUT2+
8	CJS0-		Ľ	~	CJS0- CJS0+
0	030-	Ť		Ŭ.	1_WIRE_LO_REF
7	+5 V (ISO)	-0	6	-	+5 V (ISO)_HVAB_EN
	NO		Ľ	-	NC
6	NC	+•	0	0	NC NC
5	NC		9	0	NC
					NC
4	NC	-0	9	0	NC
3	NC		Ľ	0	NC
5			_		NC
2	Reserved	-0	9	0	NC
1	SCANADAD	-	Ľ	-	EXT_TRIG_IN GND (Non-Isolated)
19	SCANADVD		~	-	GIAD (IAOIHISOIated)

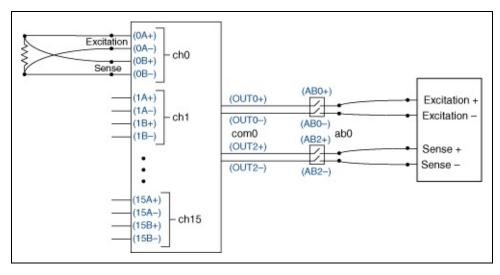
NI SCXI-1127/1128 4-Wire 16×1 Multiplexer Topology

When using the NI SCXI-1127/1128 as a <u>4-wire</u> 16×1 <u>multiplexer</u>, connect your signals using the <u>NI SCXI-1331</u> terminal block. In this topology, use the line labeled 4W inside the NI SCXI-1331 terminal block. The following figure represents the NI SCXI-1127/1128 in the 4-wire 16×1 multiplexer topology.



Legend: Software Name (Hardware Name)

4-wire mode is usually used for 4-wire resistance measurements. One pair of wires supplies the excitation current while the other pair makes the voltage measurement. In 4-wire mode, connect your excitation or source leads to xA+ and xA- and connect your measurement or sensing leads to xB+ and xB-.



Legend: Software Name (Hardware Name)

Note The previous figure shows the DMM connected to the highvoltage analog bus (HVAB) of the switch module. You can also connect the DMM to the terminal block. If you use the terminal block, connect OUT0+ and OUT0- to the excitation terminals of the DMM and connect OUT2+ and OUT2- to the sense terminals of the DMM.

Making a Connection

During scanning, a typical scan list entry is ch2->com0;. This entry routes, by default, excitation signals from 2A± to OUT0± to AB0±. This entry also routes the sensing lead from 2B± to OUT2± to AB2±.

When using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with ch2 and com0 during <u>immediate operations</u>, the signals connected to 2A± are routed to OUT0± and the signals connected to 2B± are routed to OUT2±. To route OUT0± to AB0± and OUT2± to AB2±, use the niSwitch Connect Channels VI or the niSwitch_Connect function with com0 and ab0 to make both connections.

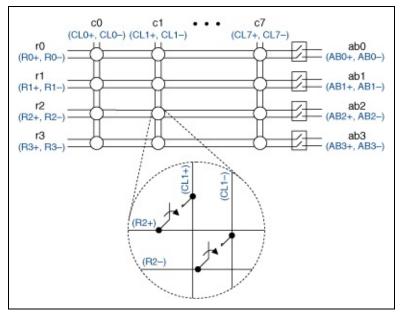
Pinout

The following figure identifies the pins for the NI SCXI-1127/1128 in the 4wire 16×1 multiplexer topology.

Pin Number	Signal Name	C A	olumn B C	Signal Name
32	CH2A+		5 0	CHOA- CHOA+
31	GH2A-		5 -	CH1A– CH1A+
30	CH5A+	_	5	СНЗА- СНЗА+
29	CH5A-		5 -	CH4A- CH4A+
28	CH8A+	+	5 0+	СНБА- СНБА+
27	CH8A-	-0	5 0-	GH7A- CH7A+
26	CH11A+		5	CH9A- CH9A+ CH10A
25	CH 11A-		5	CH10A- CH10A+ CH10A
24	CH14A+	+-•	<u>ه</u>	CH12A- CH12A+ CH12A
23	CH 14 A	\rightarrow	5	CH13A- CH13A+ CH15A-
22	CH1B+	+-0	6 0-	CH15A+ CH0B-
21	CH1B-		<u>ه</u>	CHOB+ CHOB+ CH2B-
20	CH4B+			CH2B+ CH3B-
19	CH4B-	+-0		CH3B+ CH5B-
18	CH7B+	+•	0	СН5В+ СН5В-
17	CH7B-	+-•	5 of	CH6B+ CH8B-
16	CH10B+	+-0	6	CH8B+ CH9B-
15	CH 10B		<u>ــــــــــــــــــــــــــــــــــــ</u>	CH9B+ CH11B-
14	CH13B+	+-0	6	CH11B+ CH12B-
13	CH 13B	+•	0 0 -	CH12B+ CH14B-
12	OU TO+	+-•	5 of	CH14B+ CH15B-
11	OUTO-	+-0	<u>-</u>	CH15B+ OU T1-
10	OU T3+			OU T1+ OU T2-
9	OUT3		6	OU T2+ CJS-
8	CJS	+~	5 of	CJS+ 1 WIRE LO REF
7	+5 V (ISO)	+•	<u>ه</u>	+5 V (ISO)_HVAB_EN NC
б	NG	+-0	<u>ه</u>	NC NC
5	NC		5	NC NC
4	NG			NG NG
з	NG	+-		NG NG
2	Reserved	\rightarrow		NG EXT_TRIG_IN
1	SCANADVD	<u> </u>	0 0	GND (Non-Isolated)

NI SCXI-1127/1128 2-Wire 4×8 Matrix Topology

When using the NI SCXI-1127/1128 as a 2-wire 4×8 matrix, connect your signals using the NI SCXI-1332 terminal block. In this topology, connect your positive and negative lead to CLx± or Rx± inside the NI SCXI-1332 terminal block. The following figure represents the NI SCXI-1127/1128 in the 2-wire 4×8 matrix topology.



Legend: Software Name (Hardware Name)

Making a Connection

When using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with c0 and r0 during <u>immediate operations</u>, the signal connected to CL0 \pm is routed to R0 \pm . To route R0 \pm to AB0 \pm , use niSwitch Connect Channels VI or the niSwitch_Connect function with r0 and ab0.

Pinout

The following figure identifies the pins for the NI SCXI-1127/1128 in the 2-wire 4×8 matrix topology.

Pin Number	Signal Name	A	olun B	nn C	Signal Name
		·		- 1	
32	C2+	-0	Ľ	0	C0- C0+
31	C2-		Ľ	~	C1- C1+
0000			Ľ	-	C3-
30	C5+		_		C3+ C4-
29	C5-	-	5	-	C4+ C6-
28	C0+	-0	6	•	C6+ C7-
27	C0-	+0	6	0	C7+
26	C3+		Ľ	0	C1- C1+
25	C3-		Ľ	-	C2- C2+
24	C6+		Ľ	-	C4- C4+
		200	Ľ	-	C5-
23	C6-	+		•	C5+ C7-
22	C1+	+0	5	0	C7+ C0-
21	C1-	-0	ſ	-	C0+
20	C4+		Ł	0	C2- C2+
19	C4-		Ľ	-	C3- C3+
18	C7+		Ľ	-	C5- C5+
0000		100	Ľ		C6-
17	C7-	+		-	C6+ C0-
16	C2+	+•	5	-	C0+ C1-
15	C2-	-0	5	•	C1+ C3-
14	C5+	+0	ſ	-	C3+
13	C5-	-0	Ł	0	C4- C4+
12	R0+		L	0	C6- C6+
11	R0-		Ľ	~	C7- C7+
		-	Ľ	-	B1-
10	R3+		Ľ		R1+ R2-
9	R3-	+°			R2+ CJS-
8	CJS-	-0	5	•	CJS+ 1_WIRE_LO_REF
7	+5 V (ISO)	+0	6	0	+5 V (ISO)_HVAB_EN
6	NC		L	0	NC NC
5	NC	-	Ľ	0	NC NC
4	NC		Ľ	-	NC NC
			ſ	-	NC
3	NC		_		NC
2	Reserved	+	6	-	NC EXT_TRIG_IN
1	SCANADVD	-0	۶	0	GND (Non-Isolated)

Cold-Junction Temperature Sensor Channel

The NI SCXI-1331 terminal block contains a cold-junction temperature sensor. This sensor connects to a special channel on the NI SCXI-1127/1128 that is dedicated to measuring the ambient temperature of the terminal block. This channel is used when measuring thermocouples and is always scanned as a 2-wire channel. You can include the cold-junction temperature sensor channel at any position in the scan list with any number of repetitions by indicating it with the name *cjtemp*.

For example, to scan the cold-junction temperature sensor and channels 3, 8, and 5 over the com0 bus, the scan list would be as follows:

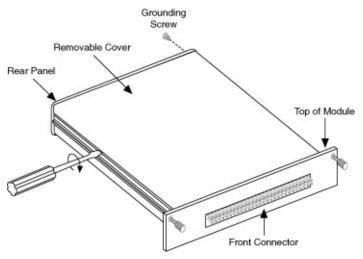
cjtemp->com0; ch3->com0; ch8->com0; ch5->com0;

Current-Loop Receiving

This topic describes how to customize your NI SCXI-1127/1128 module for current-loop receiving. The NI SCXI-1127/1128 modules have unused component spaces on the PCB for transforming individual channels to current-to-voltage converters. NI offers a process-current pack of four 249 Ω , 0.1%, 5 ppm, 0.25 W resistors. The reference designator format for the current-loop resistors is such that input channel *x* corresponds to the resistor reference designator RCL*x*. For example, the resistor pad for channel 14 is RCL14.

Caution Before installing the resistors in your module, disconnect all signals from your switch module.

Before installing your module in the SCXI chassis, install the resistors by performing the following steps while referring to the following figure:



- 1. Ground yourself using a grounding strap or a ground connected to your SCXI chassis. Properly grounding yourself prevents damage to your SCXI module from electrostatic discharge.
- 2. Remove the grounding screw from the top cover.
- 3. Snap out the top cover of the shield by placing a screwdriver in the groove at the bottom of the module and pushing down.
- 4. Remove the rear panel by unscrewing the two remaining screws.
- 5. Slide the module out of its enclosure.
- 6. Bend and trim the resistor lead as shown in the following figure. Be sure that the resistor does not extend more than 0.5 in. above the surface of the circuit board and that the leads do not protrude

through the bottom of the board by more than 0.060 in.



- 7. Insert the resistor into the appropriate socket, labeled RCL*x*.
- 8. Solder the leads to the pad on the bottom side of the module.
- 9. Slide the module back into its enclosure.
- 10. Install the hex bracket screw.
- 11. Install the rear panel.
- 12. Install the top cover and grounding screw.

High-Voltage Analog Bus (HVAB)

The NI SCXI-1127/1128/1129/1175 modules have the capability to route analog signals to their rear connector. If you want to share these analog signals among several modules, use an HVAB adapter such as the NI SCXI-1357/1358/1359. HV8 connectors on the adapters allow you to easily route these signals to a DMM, such as the NI 4060/4070, for measurements. If you are using an SCXI chassis and/or a NI PXI-1010 chassis, use an NI SCXI-1357/1358/1359 with an HV8-BAN4 cable. If you are using an NI PXI-1011 chassis, you only need an HV8-BAN4 cable because the chassis has an integrated HVAB backplane.

- NI SCXI-1127/1128 Users—When you connect a custom terminal block or cable, it is important that you incorporate the safety interlock scheme into the terminal block/cable. Do this by connecting the +5 V (ISO)_HVAB_EN signal to the +5 V (ISO) signal. These signals are shown in the 1-wire 64×1 multiplexer pinout.
- NI SCXI-1175 Users—Connecting to the HVAB is only supported in the <u>2-wire 98x1 multiplexer</u> and <u>2-wire 95x1 multiplexer</u> topologies.

Derating Modules that Share the HVAB

As a safety precaution, modules that share a common HVAB *must* be derated to their lowest common voltage rating, even if they do not connect signals to the backplane. The following examples illustrate how to derate your modules.

Example 1

SCXI-1000 chassis

SCXI-1359 2-slot backplane adapter behind Slots 3 and 4

SCXI-1127 (300 V, CAT II) in Slot 4

SCXI-1129 (150 V, CAT I) in Slot 3

Both modules share the HVAB. Therefore, the NI SCXI-1127 must not exceed the rating of the NI SCXI-1129 (150 V, CAT I).

Example 2

SCXI-1000 chassis

SCXI-1359 2-slot backplane adapter behind Slots 3 and 4

SCXI-1127 (300 V, CAT II) in Slot 4

SCXI-1129 (150 V, CAT I) in Slot 2

The SCXI-1127 does not share the HVAB with the NI SCXI-1129. Therefore, the NI SCXI-1127 can operate at the full rating (300 V, CAT II).

Example 3

SCXI-1000 chassis

SCXI-1359 2-slot backplane adapter behind Slots 3 and 4

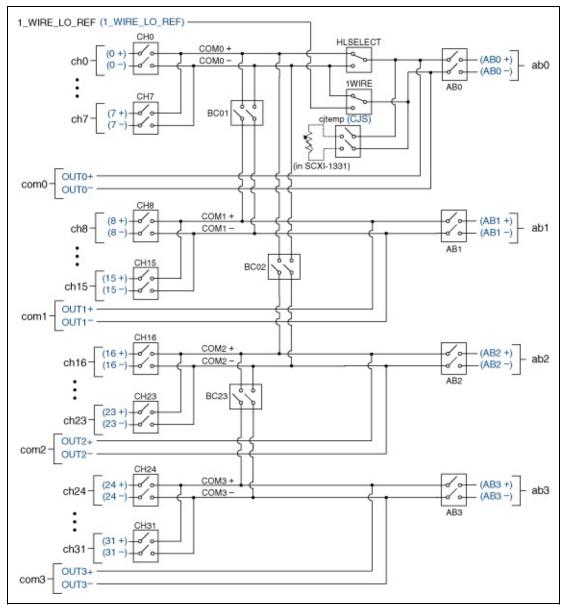
SCXI-1127 (300 V, CAT II) in Slot 4

SCXI-1190 (30 V, CAT I) in Slot 3

The SCXI-1190 does not have a HVAB connector. Therefore, the NI SCXI-1127 can operate at the full rating (300 V, CAT II).

NI SCXI-1127/1128 Independent Topology

When using the NI SCXI-1127/1128 in the independent topology, connect your signals using the <u>NI SCXI-1331</u> terminal block. In this topology, you utilize the full routing capabilities of the NI SCXI-1127/1128. The following figure represents the NI SCXI-1127/1128 in the independent topology.



Legend: Software Name (Hardware Name)

Making a Connection

When using the Traditional NI-DAQ (Legacy) <u>resource name</u> with the independent topology, control the individual relays using the <u>niSwitch</u> <u>Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function. When using the NI-DAQmx resource name with the independent topology, you can *also* use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function to control the relays. Refer to the NI SCXI-1127/1128 <u>hardware diagram</u> for relay names.



Note If you are using the NI SCXI-1127/1128 with Traditional DAQ in independent topology and 64 signals, refer to Knowledge Base #2W3A99HQ at ni.com/support for more information.

Matrix Expansion

To expand columns or rows with the NI SCXI-1127/1128 configured as a 4×8 matrix, use matrix expansion cables. Each cable can route four pairs of signals from one module to the other. These cables connect directly into the NI SCXI-1332. To form an 8×8 matrix with two NI SCXI-1127/1128 modules, connect all eight columns from both NI SCXI-1127/1128 modules. Connect one cable to J2 and one cable to J3 on both NI SCXI-1332 terminal blocks.

To form a 4×16 matrix with two NI SCXI-1127/1128s, connect all four rows from both NI SCXI-1127/1128 modules. Connect one cable to J4 on both NI SCXI-1332 terminal blocks. Refer to *Application Note 174* at <u>ni.com/zone</u> for additional information.

Multiplexer Expansion

To handle large channel counts, you can expand the size of the multiplexer with additional NI SCXI-1127/1128 switch modules. The NI SCXI-1127/1128 supports the HVAB with a special adapter. The NI SCXI-1357/1358/1359 installed at the rear of the module connects all the commons of each NI SCXI-1127/1128. For example, in a 2-wire 32×1 multiplexer, two NI SCXI-1127/1128 modules can create a 64×1 2-wire multiplexer with an NI SCXI-1359. The output signal can easily be routed to an NI 4070 DMM to be measured. In the same topology, and with a NI SCXI-1357, you can create a 128×1 2-wire multiplexer with four NI SCXI-1127/1128 modules.

NI SCXI-1127/1128 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI SCXI-1127/1128.

Trigger Input	Software	На
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI line 0
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	EXTT the NI 1331 block
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 adapte SCXI- 1357/
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front termir of the Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front termir of the Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front termir of the Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front termir of the Slot 4
Front	Front Connector Module 5	Front

Connector Module 5	(NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	termi of the Slot 5
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Front termi of the Slot 6
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Front termi of the Slot 7
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Front termi of the Slot 8
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Front termi of the Slot 9
Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Front termi of the Slot 1
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Front termi of the Slot 1
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front termi of the Slot 1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 adap SCXI 1357 conne

		the Slo
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin ada SC 135 cor the Slo
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin ada SC 135 cor the Slo
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin ada SC 135 cor the Slo
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin ada SC 135 cor the Slo
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin ada SC 135 cor the Slo

Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 adapt SCXI 1357 conne the m Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 adapt SCXI 1357 conne the m Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 adapt SCXI 1357 conne the m Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 adapt SCXI 1357 conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 adapt SCXI 1357 conne the m Slot 1
Rear Connector	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 6 adap

Module 12	SCXI- 1357/: conne
	the m
	Slot 1

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI SCXI-1127/1128.

Scan Advanced Output	Software	Hard
None	None (NISWITCH_VAL_NONE)	N/A
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI trigge 2
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	SCAN on NI SCXI- 1331 termir block
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front panel termir block the modu Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front panel termir block the modu Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front panel termir block

		the modu Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front panel termin block the modu Slot 4
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Front panel termin block the modu Slot 5
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Front panel termin block the modu Slot 6
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Front panel termin block the modu Slot 7
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Front panel termin block the modu

		Slot 8
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Front panel termir block the modu Slot 9
Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Front panel termir block the modu Slot 1
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Front panel termir block the modu Slot 1
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front panel termir block the modu Slot 1

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1127 Relay Replacement

The NI SCXI-1127 uses electromechanical armature relays.

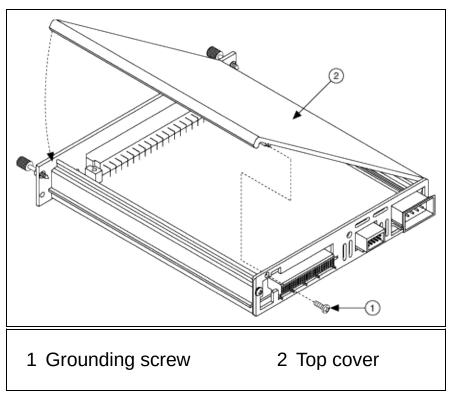
Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number	
Aromat (NAiS)	TXS-2SL-4.5V	
NEC/TOKIN	EF2-4.5NUX	

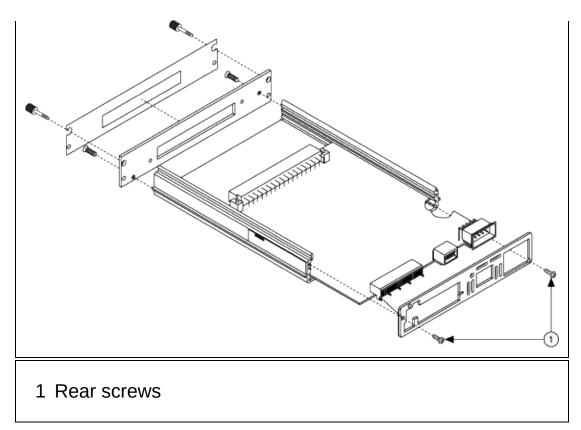
Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

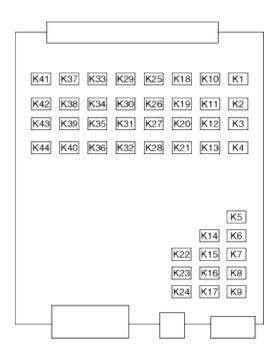
- 1. Ground yourself using a grounding strap or a ground connected to your SCXI Chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the grounding screw from the back of the module.

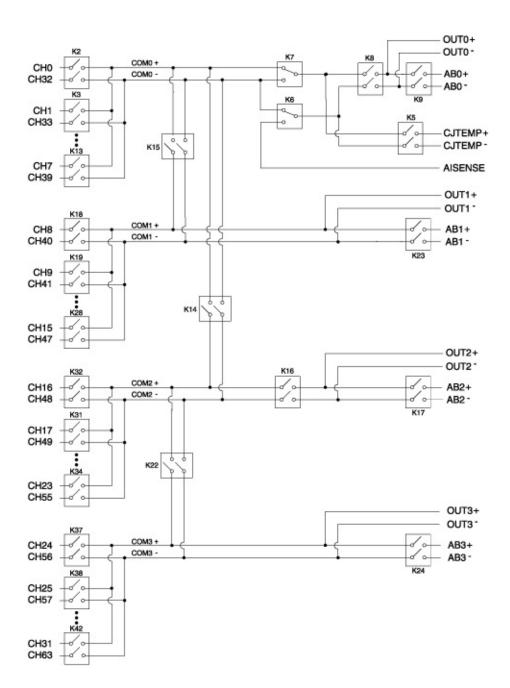


- 3. Carefully remove the top cover of the module using a flathead screwdriver.
- 4. Remove the two screws from the back of the module.



5. Locate the relay you want to replace. Refer to the following figures and table for relay locations.





Channel Name	Relay Name
CH0, CH32	K2
CH1, CH33	K3
CH2, CH34	K1
CH3, CH35	K4

CH4, CH36	K11
CH5, CH37	K10
CH6, CH38	K12
CH7, CH39	K13
CH8, CH40	K18
CH9, CH41	K19
CH10, CH42	K20
CH11, CH43	K21
CH12, CH44	K25
CH13, CH45	K26
CH14, CH46	K27
CH15, CH47	K28
CH16, CH48	K32
CH17, CH49	K31
CH18, CH50	K29
CH19, CH51	K30
CH20, CH52	K35
CH21, CH53	K36
CH22, CH54	K33
CH23, CH55	K34
CH24, CH56	K37
CH25, CH57	K38
CH26, CH58	K39
CH27, CH59	K40
CH28, CH60	K44
CH29, CH61	K43
CH30, CH62	K41
CH31, CH63	K42
BC01	K15
BC02	K14

BC23	K22
HI_SELECT	K7
1WIRE	K6
4W_HVAB_DISC	K16
2W_HVAB_DISC	K8
CJTEMP	K5
AB0	K9
AB1	K23
AB2	K17
AB3	K24

Replace the Relay

Before you begin, make sure you have the following items:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

NI SCXI-1129

The NI SCXI-1129 is a 256 crosspoint, high-density <u>matrix</u> module for the SCXI platform designed for switching low and high voltages. For low-voltage measurements, the NI SCXI-1129 uses relays with <9 μ V thermal offset to ensure accurate measurements. The SCXI-1129 supports routing signals to the <u>high-voltage analog bus</u>.



Note For EMC compliance, operate this device with shielded cables.

Operation Modes

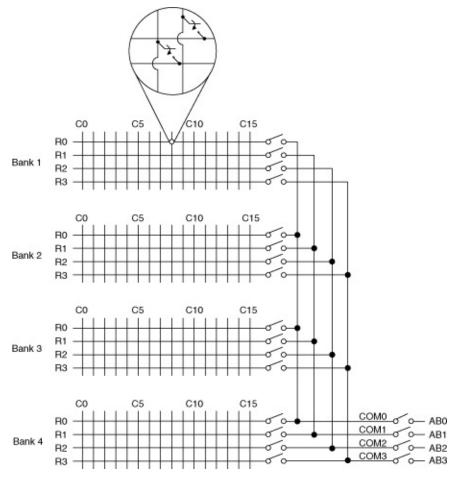
The following table lists the supported topology of the NI SCXI-1129 and possible <u>operation modes</u>.

Topology	Software Name
<u>Quad</u> <u>4×16</u> Matrix	1129/2-Wire Quad 4x16 Matrix (NISWITCH_TOPOLOGY_1129_2_WIRE_QUAD_4X16_MATI
<u>2-Wire</u> <u>4×64</u> <u>Matrix</u>	1129/2-Wire 4x64 Matrix (NISWITCH_TOPOLOGY_1129_2_WIRE_4X64_MATRIX)
<u>2-Wire</u> <u>8×32</u> Matrix	1129/2-Wire 8x32 Matrix (NISWITCH_TOPOLOGY_1129_2_WIRE_8X32_MATRIX)
<u>2-Wire</u> <u>16×16</u> Matrix	1129/2-Wire 16x16 Matrix (NISWITCH_TOPOLOGY_1129_2_WIRE_16X16_MATRIX)
<u>Dual</u> <u>4×32</u> Matrix	1129/2-Wire Dual 4x32 Matrix (NISWITCH_TOPOLOGY_1129_2_WIRE_DUAL_4X32_MATF
<u>2-Wire</u> Dual 8×16 Matrix	1129/2-Wire Dual 8x16 Matrix (NISWITCH_TOPOLOGY_1129_2_WIRE_DUAL_8X16_MATF

NI SCXI-1129 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1129.

Note Relay names are the same for every topology.

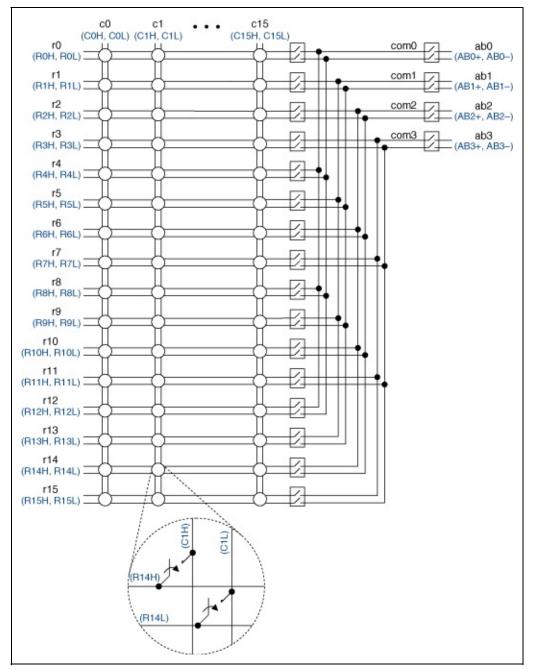


The following table lists relay names for the NI SCXI-1129.

Bank 1 Relays	Bank 2 Relays	Bank 3 Relays	Bar Rel
B1R0C0B1R0C15	B2R0C0B2R0C15	B3R0C0B3R0C15	B4R0C0
B1R1C0B1R1C15	B2R1C0B2R1C15	B3R1C0B1R1C15	B4R1C0
B1R2C0B1R2C15	B2R2C0B2R2C15	B3R2C0B1R2C15	B4R2C0
B1R3C0B1R3C15	B2R3C0B2R3C15	B3R3C0B1R3C15	B4R3C0

NI SCXI-1129 2-Wire 16×16 Matrix Topology

The <u>NI SCXI-1336</u> terminal block provides connections to the NI SCXI-1129 in the <u>2-wire</u> 16×16 <u>matrix</u> topology. The following figure represents the NI SCXI-1129 in the 2-wire 16×16 matrix topology.





The SCXI-1129 in this topology contains a 16×16 matrix. In this topology, for example, you can connect r1 to c0. When connecting signals for r1,

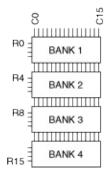
you would connect them to R1H and R1L in the terminal block. When connecting signals for c0, you would connect them to C0H and C0L in the terminal block.

Notice that you can connect to the <u>high-voltage analog bus (HVAB)</u> for routing signals to the back of the switch module.

You can connect the channels of the NI SCXI-1129 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect row 1 column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to r1 and the **channel 2** parameter set to c1.

When <u>scanning</u> the NI SCXI-1129, a typical <u>scan list</u> entry could be r_{1-c_1} ; This entry routes the signal connected to row 1 to column 1.

Bank Connection Diagram



Terminal Block Connections

The SCXI-1336 terminal block connects b1cx, b2cx, b3cx, and b4cx columns to their respective columns to operate the NI SCXI-1129 as a 2-wire 16×16 matrix. Refer to the <u>Pinout</u> section below for pin locations.

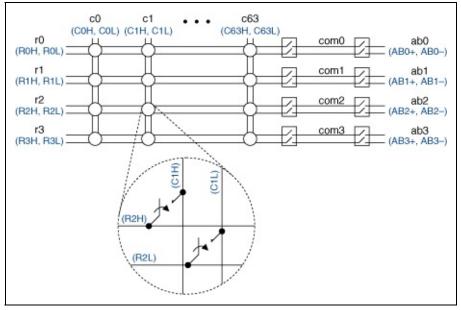
Pinout

The following figure identifies the pins for the NI SCXI-1129.

Pin	Signal		Colum		Signal
Number	Name	A	вс	D	Name
15	TBEECLK			-	GND
45	TBEEOUT TBEEEN		76	-	BMOIS* NC
44	SCANADV EXTRIG1	+	72	<u> </u>	INTERLOCK +5 V
43	NC	+0	7	-	NC
42	NC NC	-	7	-	NC NC
41	NC NC		7	-	NC NC
40	B2C15-		72	-	B4C15- B4C15+
39	B2C15+ B2C14-	_	72	-	B4C14-
	B2C14+ B2C13-	<u> </u>		-	B4C14+ B4C13-
38	B2C13+ B2C12-	-	76	-	B4C13+ B4C12-
37	B2C12+ B2C11-	10	7	<u> </u>	B4C12+ B4C11-
36	B2C11+	+0	7	<u> </u>	B4C11+
35	B2C10- B2C10+	-0	7	-	B4C10- B4C10+
34	B2C9- B2C9+		72	~	B4C9- B4C9+
33	B2C8-		72	-	B4C8- B4C8+
	B2C8+ B2C7-		75		B4C7-
32	B2C7+ B2C6-	10		-	B4C7+ B4C6-
31	B2C6+ B2C5-	-	7	<u> </u>	B4C6+ B4C5-
30	B2C5+	+	99	<u> </u>	B4C5+
29	B2C4- B2C4+	-+0	72	0	B4C4- B4C4+
28	B2C3- B2C3+		72	~	B4C3- B4C3+
27	B2C2- B2C2+		72	-	B4C2- B4C2+
26	B2C1-		7		B4C1-
	B2C1+ B2C0-	10		-	B4C1+ B4C0-
25	B2C0+ B2R3-		70	°	B4C0+ B4R3-
24	B2R3+ B2R2-	+	32	<u> </u>	B4R3+ B4R2-
23	B2R2+	-0	76	-	B4R2+
22	B2R1- B2R1+	-	72	~	B4R1- B4R1+
21	B2R0- B2R0+	-	7	-	B4R0- B4R0+
20	B1C15- B1C15+		7	-	B3C15- B3C15+
19	B1C14-	_	72		B3C14-
10000	B1C14+ B1C13-			-	B3C14+ B3C13-
18	B1C13+ B1C12-	-	30	•	B3C13+ B3C12-
17	B1C12+	+	99	<u> </u>	B3C12+
16	B1C11- B1C11+	-0	7	-	B3C11- B3C11+
15	B1C10- B1C10+		72	-	B3C10- B3C10+
14	B1C9- B1C9+	+	72	-	B3C9- B3C9+
13	B1C8-		72		B3C8-
12	B1C8+ B1C7-	-	72	-	B3C8+ B3C7-
	B1C7+ B1C6-			<u> </u>	B3C7+ B3C6-
11	B1C6+ B1C5-	-	72	<u> </u>	B3C6+ B3C5-
10	B1C5+	-+0	7	~	B3C5+
9	B1C4- B1C4+	-	72	-	B3C4- B3C4+
8	B1C3- B1C3+	-	35	-	B3C3- B3C3+
7	B1C2- B1C2+		72	-	B3C2- B3C2+
6	B1C1-		72		B3C1-
23	B1C1+ B1C0-	1		-	B3C1+ B3C0-
5	B1C0+ B1R3-	<u> </u>	36	-	B3C0+ B3R3-
4	B1R3+	-	92	<u>+</u>	B3R3+
3	B1R2- B1R2+	-	72	0	B3R2- B3R2+
2	B1R1- B1R1+	-	72	-	B3R1- B3R1+
1	B1R0- B1R0+		72	-	B3R0- B3R0+
	enter	Ľ			

NI SCXI-1129 2-Wire 4×64 Matrix Topology

The <u>NI SCXI-1334</u> terminal block provides connections to the NI SCXI-1129 in the <u>2-wire</u> 4×64 <u>matrix</u> topology. The following figure represents the NI SCXI-1129 in the 2-wire 4×64 matrix topology.



Legend: Software Name (Hardware Name)

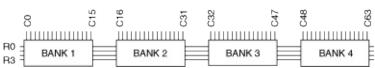
The SCXI-1129 in this topology contains a 4×64 matrix. In this topology, for example, you can connect r1 to c0. When connecting signals for r1, you would connect them to R1H and R1L in the terminal block. When connecting signals for c0, you would connect them to C0H and C0L in the terminal block.

Notice that you can connect to the <u>high-voltage analog bus (HVAB</u>). The HVAB routes to the back of the switch module.

You can connect the channels of the NI SCXI-1129 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect row 1 column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to r1 and the **channel 2** parameter set to c1.

When scanning the NI SCXI-1129, a typical scan list entry could be r_{1-c_1} . This entry routes the signal connected to row 1 to column 1.

Bank Connection Diagram C15 C31 C47 8



Terminal Block Connections

The NI SCXI-1334 terminal block creates the following connections to operate the NI SCXI-1129 as a 2-wire 4×64 matrix. Refer to the figure in the <u>Pinout</u> section for pin locations.

Connection	Pins
1	b1r0+ to b2r0+, b3r0+, b4r0+
2	b1r0- to b2r0-, b3r0-, b4r0-
3	b1r1+ to b2r1+, b3r1+, b4r1+
4	b1r1- to b2r1-, b3r1-, b4r1-
5	b1r2+ to b2r2+, b3r2+, b4r2+
6	b1r2- to b2r2-, b3r2-, b4r2-
7	b1r3+ to b2r3+, b3r3+, b4r3+
8	b1r3- to b2r3-, b3r3-, b4r3-

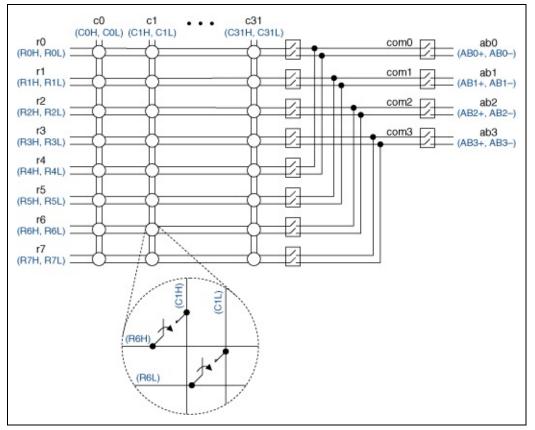
Pinout

The following figure identifies the pins for the NI SCXI-1129.

Pin	Signal		Colum		Signal
Number	Name	A	вс	D	Name
15	TBEECLK			-	GND
45	TBEEOUT TBEEEN		76	-	BMOIS* NC
44	SCANADV EXTRIG1	+	72	<u> </u>	INTERLOCK +5 V
43	NC	+0	7	-	NC
42	NC NC	-	7	-	NC NC
41	NC NC		7	-	NC NC
40	B2C15-		72	-	B4C15- B4C15+
39	B2C15+ B2C14-	_	72	-	B4C14-
	B2C14+ B2C13-	<u> </u>		-	B4C14+ B4C13-
38	B2C13+ B2C12-	-	76	<u> </u>	B4C13+ B4C12-
37	B2C12+ B2C11-	10	7	<u> </u>	B4C12+ B4C11-
36	B2C11+	+0	7	<u> </u>	B4C11+
35	B2C10- B2C10+	-0	7	-	B4C10- B4C10+
34	B2C9- B2C9+		72	~	B4C9- B4C9+
33	B2C8-		72	-	B4C8- B4C8+
	B2C8+ B2C7-		75		B4C7-
32	B2C7+ B2C6-			-	B4C7+ B4C6-
31	B2C6+ B2C5-		7	<u> </u>	B4C6+ B4C5-
30	B2C5+	+	99	<u> </u>	B4C5+
29	B2C4- B2C4+	-+0	7	0	B4C4- B4C4+
28	B2C3- B2C3+		72	~	B4C3- B4C3+
27	B2C2- B2C2+		72	-	B4C2- B4C2+
26	B2C1-		7		B4C1-
	B2C1+ B2C0-	10		-	B4C1+ B4C0-
25	B2C0+ B2R3-		70	°	B4C0+ B4R3-
24	B2R3+ B2R2-	+	32	<u> </u>	B4R3+ B4R2-
23	B2R2+	-0	76	-	B4R2+
22	B2R1- B2R1+	-	72	~	B4R1- B4R1+
21	B2R0- B2R0+	-	7	-	B4R0- B4R0+
20	B1C15- B1C15+		7	-	B3C15- B3C15+
19	B1C14-	_	7		B3C14-
10000	B1C14+ B1C13-			-	B3C14+ B3C13-
18	B1C13+ B1C12-	-	30	•	B3C13+ B3C12-
17	B1C12+	+	99	<u> </u>	B3C12+
16	B1C11- B1C11+	-0	7	-	B3C11- B3C11+
15	B1C10- B1C10+		72	-	B3C10- B3C10+
14	B1C9- B1C9+	+	72	-	B3C9- B3C9+
13	B1C8-		72		B3C8-
12	B1C8+ B1C7-	-	72	-	B3C8+ B3C7-
	B1C7+ B1C6-			<u> </u>	B3C7+ B3C6-
11	B1C6+ B1C5-	-	72	<u> </u>	B3C6+ B3C5-
10	B1C5+	-+0	7	~	B3C5+
9	B1C4- B1C4+	-	72	-	B3C4- B3C4+
8	B1C3- B1C3+	-	35	-	B3C3- B3C3+
7	B1C2- B1C2+		72	-	B3C2- B3C2+
6	B1C1-		72		B3C1-
23	B1C1+ B1C0-	1		-	B3C1+ B3C0-
5	B1C0+ B1R3-	<u> </u>	76	-	B3C0+ B3R3-
4	B1R3+	-	92	<u>+</u>	B3R3+
3	B1R2- B1R2+	-	72	0	B3R2- B3R2+
2	B1R1- B1R1+	-	72	-	B3R1- B3R1+
1	B1R0- B1R0+		72	-	B3R0- B3R0+
	enter	Ľ			

NI SCXI-1129 2-Wire 8×32 Matrix Topology

The <u>NI SCXI-1335</u> terminal block provides connections to the NI SCXI-1129 in the <u>2-wire</u> 8×32 <u>matrix</u> topology. The following figure represents the NI SCXI-1129 in the 2-wire 8×32 matrix topology.



Legend: Software Name (Hardware Name)

The SCXI-1129 in this topology contains an 8×32 matrix. In this topology, for example, you can connect r1 to c0. When connecting signals for r1, you would connect them to R1H and R1L in the terminal block. When connecting signals for c0, you would connect them to C0H and C0L in the terminal block.

Notice that you can connect to the <u>high-voltage analog bus (HVAB)</u> for routing signals to the back of the switch module.

You can connect the channels of the NI SCXI-1129 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect row 1 column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to r1 and the **channel 2** parameter set to c1.

When scanning the NI SCXI-1129, a typical scan list entry could be r_{1-c_1} . This entry routes the signal connected to row 1 to column 1.

Bank Connection Diagram

8	C15	C16 C31
	ШЦ	
R0 BANK 1		BANK 2
	ШЦ	
R4 BANK	3	BANK 4
R7 -		1

Terminal Block Connections

The SCXI-1335 terminal block creates the following connections to operate the NI SCXI-1129 as a 2-wire 8×32 matrix. Refer to the figure in the <u>Pinout</u> section for pin locations.

Connection	Pins
R0H	B1R0+ to B2R0+
R0L	B1R0- to B2R0-
R1H	B1R1+ to B2R1+
R1L	B1R1- to B2R1-
R2H	B1R2+ to B2R2+
R2L	B1R2- to B2R2-
R3H	B1R3+ to B2R3+
R3L	B1R3- to B2R3-
R4H	B3R0+ to B4R0+
R4L	B3R0- to B4R0-
R5H	B3R1+ to B4R1+
R5L	B3R1- to B4R1-
R6H	B3R2+ to B4R2+
R6L	B3R2- to B4R2-
R7H	B3R3+ to B4R3+
R7L	B3R3- to B4R3-
COH	B1C0+ to B3C0+
COL	B1C0- to B3C0-
C1H	B1C1+ to B3C1+
C1L	B1C1- to B3C1-
C2H	B1C2+ to B3C2+
C2L	B1C2- to B3C2-
СЗН	B1C3+ to B3C3+
C3L	B1C3- to B3C3-

C4H	B1C4+ to B3C4+
C4L	B1C4- to B3C4-
C5H	B1C5+ to B3C5+
C5L	B1C5- to B3C5-
C6H	B1C6+ to B3C6+
C6L	B1C6- to B3C6-
C7H	B1C7+ to B3C7+
C7L	B1C7- to B3C7-
C8H	B1C8+ to B3C8+
C8L	B1C8- to B3C8-
C9H	B1C9+ to B3C9+
C9L	B1C9- to B3C9-
C10H	B1C10+ to B3C10+
C10L	B1C10- to B3C10-
C11H	B1C11+ to B3C11+
C11L	B1C11- to B3C11-
C12H	B1C12+ to B3C12+
C12L	B1C12- to B3C12-
C13H	B1C13+ to B3C13+
C13L	B1C13- to B3C13-
C14H	B1C14+ to B3C14+
C14L	B1C14- to B3C14-
C15H	B1C15+ to B3C15+
C15L	B1C15- to B3C15-
C16H	B2C0+ to B4C0+
C16L	B2C0- to B4C0-
C17H	B2C1+ to B4C1+
C17L	B2C1- to B4C1-
C18H	B2C2+ to B4C2+
C18L	B2C2- to B4C2-

C19H	B2C3+ to B4C3+
C19L	B2C3- to B4C3-
C20H	B2C4+ to B4C4+
C20L	B2C4- to B4C4-
C21H	B2C5+ to B4C5+
C21L	B2C5- to B4C5-
C22H	B2C6+ to B4C6+
C22L	B2C6- to B4C6-
C23H	B2C7+ to B4C7+
C23L	B2C7- to B4C7-
C24H	B2C8+ to B4C8+
C24L	B2C8- to B4C8-
C25H	B2C9+ to B4C9+
C25L	B2C9- to B4C9-
C26H	B2C10+ to B4C10+
C26L	B2C10- to B4C10-
C27H	B2C11+ to B4C11+
C27L	B2C11- to B4C11-
C28H	B2C12+ to B4C12+
C28L	B2C12- to B4C12-
C29H	B2C13+ to B4C13+
C29L	B2C13- to B4C13-
C30H	B2C14+ to B4C14+
C30L	B2C14- to B4C14-
C31H	B2C15+ to B4C15+
C31L	B2C15- to B4C15-

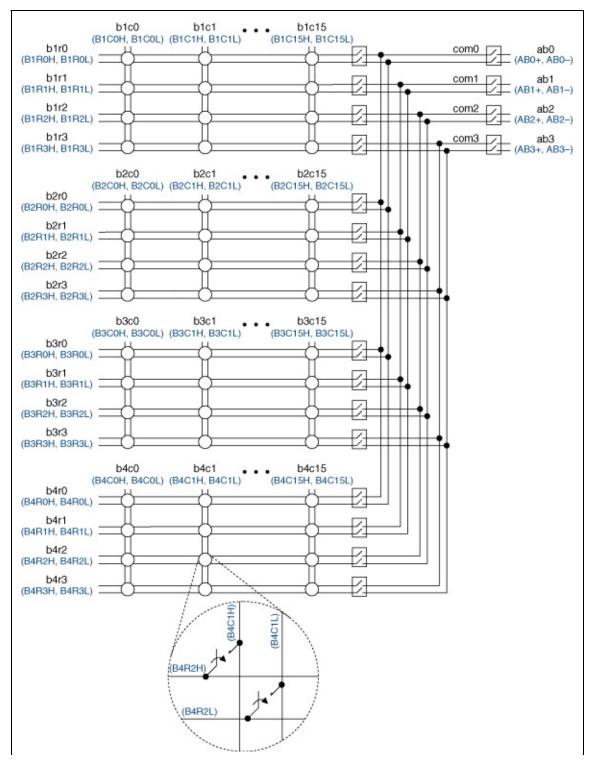
Pinout

The following figure identifies the pins for the NI SCXI-1129.

Pin	Signal		Colum		Signal
Number	Name	A	вс	D	Name
15	TBEECLK			-	GND
45	TBEEOUT TBEEEN		76	-	BMOIS* NC
44	SCANADV EXTRIG1	+	72	<u> </u>	INTERLOCK +5 V
43	NC	+0	7	-	NC
42	NC NC	-	7	-	NC NC
41	NC NC		7	-	NC NC
40	B2C15-		72	-	B4C15- B4C15+
39	B2C15+ B2C14-	_	72	-	B4C14-
	B2C14+ B2C13-	<u> </u>		-	B4C14+ B4C13-
38	B2C13+ B2C12-	-	76	<u> </u>	B4C13+ B4C12-
37	B2C12+ B2C11-	10	7	<u> </u>	B4C12+ B4C11-
36	B2C11+	+0	7	<u> </u>	B4C11+
35	B2C10- B2C10+	-0	7	-	B4C10- B4C10+
34	B2C9- B2C9+		72	~	B4C9- B4C9+
33	B2C8-		72	-	B4C8- B4C8+
	B2C8+ B2C7-		75		B4C7-
32	B2C7+ B2C6-			-	B4C7+ B4C6-
31	B2C6+ B2C5-		7	<u> </u>	B4C6+ B4C5-
30	B2C5+	+	99	-	B4C5+
29	B2C4- B2C4+	-+0	72	0	B4C4- B4C4+
28	B2C3- B2C3+		72	~	B4C3- B4C3+
27	B2C2- B2C2+		72	-	B4C2- B4C2+
26	B2C1-		7		B4C1-
	B2C1+ B2C0-	10		-	B4C1+ B4C0-
25	B2C0+ B2R3-		70	°	B4C0+ B4R3-
24	B2R3+ B2R2-	+	32	<u> </u>	B4R3+ B4R2-
23	B2R2+	-0	76	-	B4R2+
22	B2R1- B2R1+	-	72	~	B4R1- B4R1+
21	B2R0- B2R0+	-	7	-	B4R0- B4R0+
20	B1C15- B1C15+		7	-	B3C15- B3C15+
19	B1C14-	_	72		B3C14-
10000	B1C14+ B1C13-			-	B3C14+ B3C13-
18	B1C13+ B1C12-	-	70	•	B3C13+ B3C12-
17	B1C12+	+	99	-	B3C12+
16	B1C11- B1C11+	-0	7	-	B3C11- B3C11+
15	B1C10- B1C10+		72	-	B3C10- B3C10+
14	B1C9- B1C9+	+	72	-	B3C9- B3C9+
13	B1C8-		72		B3C8-
12	B1C8+ B1C7-	-	72	-	B3C8+ B3C7-
	B1C7+ B1C6-			<u> </u>	B3C7+ B3C6-
11	B1C6+ B1C5-	-	72	<u> </u>	B3C6+ B3C5-
10	B1C5+	-+0	7	~	B3C5+
9	B1C4- B1C4+	-	72	-	B3C4- B3C4+
8	B1C3- B1C3+		35	-	B3C3- B3C3+
7	B1C2- B1C2+		72	-	B3C2- B3C2+
6	B1C1-		72		B3C1-
23	B1C1+ B1C0-	1		-	B3C1+ B3C0-
5	B1C0+ B1R3-	<u> </u>	76	-	B3C0+ B3R3-
4	B1R3+	-	92	<u>+</u>	B3R3+
3	B1R2- B1R2+	-	72	0	B3R2- B3R2+
2	B1R1- B1R1+	-	72	-	B3R1- B3R1+
1	B1R0- B1R0+		72	-	B3R0- B3R0+
	enter	Ľ			

NI SCXI-1129 2-Wire Quad 4×16 Matrix Topology

The <u>NI SCXI-1333</u> terminal block provides connections to the NI SCXI-1129 in the <u>2-wire</u> quad 4×16 <u>matrix</u> topology. The following figure represents the NI SCXI-1129 in the 2-wire quad 4×16 matrix topology.



Legend: Software Name (Hardware Name)

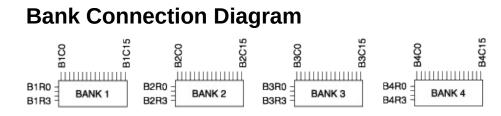
L

The SCXI-1129 in this topology contains four banks of 4×16 matrices. You can only connect rows and columns to rows and columns in the same bank. In this topology, for example, you can connect b1r1 to b1c0; however, you cannot connect b1r1 to b2c1. When connecting signals for b1r1, connect them to B1R1H and B1R1L in the terminal block. When connecting signals for b1c0, you would connect them to B1C0H and B1C0L in the terminal block.

As shown in the previous figure, all banks can connect to the <u>high-</u> voltage analog bus (HVAB). The HVAB routes to the back of the switch module.

You can connect the channels of the NI SCXI-1129 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect b1r1 to b1c1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to b1r1 and the **channel 2** parameter set to b1c1.

When <u>scanning</u> the NI SCXI-1129, a typical <u>scan list</u> entry could be b1r1->b1c1;. This entry routes the signal connected to b1r1 to b1c1.



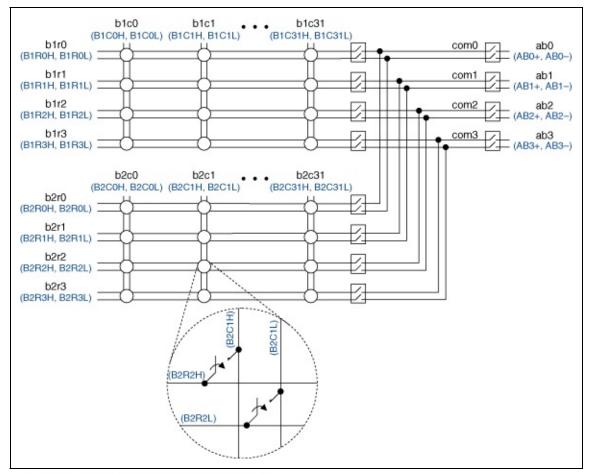
Pinout

The following figure identifies the pins for the NI SCXI-1129.

Pin	Signal		Colum		Signal
Number	Name	A	вс	D	Name
15	TBEECLK			-	GND
45	TBEEOUT TBEEEN		76	-	BMOIS* NC
44	SCANADV EXTRIG1	+	72	<u> </u>	INTERLOCK +5 V
43	NC	+0	7	-	NC
42	NC NC	-	7	-	NC NC
41	NC NC		7	-	NC NC
40	B2C15-		72	-	B4C15- B4C15+
39	B2C15+ B2C14-	_	72	-	B4C14-
	B2C14+ B2C13-	<u> </u>		-	B4C14+ B4C13-
38	B2C13+ B2C12-	-	76	<u> </u>	B4C13+ B4C12-
37	B2C12+ B2C11-	10	7	<u> </u>	B4C12+ B4C11-
36	B2C11+	+0	7	<u> </u>	B4C11+
35	B2C10- B2C10+	-0	7	-	B4C10- B4C10+
34	B2C9- B2C9+		72	~	B4C9- B4C9+
33	B2C8-		72	-	B4C8- B4C8+
	B2C8+ B2C7-		75		B4C7-
32	B2C7+ B2C6-			-	B4C7+ B4C6-
31	B2C6+ B2C5-		7	<u> </u>	B4C6+ B4C5-
30	B2C5+	+	99	<u> </u>	B4C5+
29	B2C4- B2C4+	-+0	72	0	B4C4- B4C4+
28	B2C3- B2C3+		72	~	B4C3- B4C3+
27	B2C2- B2C2+		72	-	B4C2- B4C2+
26	B2C1-		7		B4C1-
	B2C1+ B2C0-	10		-	B4C1+ B4C0-
25	B2C0+ B2R3-		70	°	B4C0+ B4R3-
24	B2R3+ B2R2-	+	32	<u> </u>	B4R3+ B4R2-
23	B2R2+	-0	76	-	B4R2+
22	B2R1- B2R1+	-	72	~	B4R1- B4R1+
21	B2R0- B2R0+	-	7	-	B4R0- B4R0+
20	B1C15- B1C15+		7	-	B3C15- B3C15+
19	B1C14-	_	72		B3C14-
10000	B1C14+ B1C13-			-	B3C14+ B3C13-
18	B1C13+ B1C12-	-	70	•	B3C13+ B3C12-
17	B1C12+	+	99	-	B3C12+
16	B1C11- B1C11+	-0	7	-	B3C11- B3C11+
15	B1C10- B1C10+		72	-	B3C10- B3C10+
14	B1C9- B1C9+	+	72	-	B3C9- B3C9+
13	B1C8-		72		B3C8-
12	B1C8+ B1C7-	-	72	-	B3C8+ B3C7-
	B1C7+ B1C6-			<u> </u>	B3C7+ B3C6-
11	B1C6+ B1C5-	-	72	<u> </u>	B3C6+ B3C5-
10	B1C5+	-+0	7	~	B3C5+
9	B1C4- B1C4+	-	72	-	B3C4- B3C4+
8	B1C3- B1C3+		35	-	B3C3- B3C3+
7	B1C2- B1C2+		72	-	B3C2- B3C2+
6	B1C1-		72		B3C1-
23	B1C1+ B1C0-	1		-	B3C1+ B3C0-
5	B1C0+ B1R3-	<u> </u>	36	-	B3C0+ B3R3-
4	B1R3+	-	92	<u>+</u>	B3R3+
3	B1R2- B1R2+	-	72	0	B3R2- B3R2+
2	B1R1- B1R1+	-	72	-	B3R1- B3R1+
1	B1R0- B1R0+		72	-	B3R0- B3R0+
	enter	Ľ			

NI SCXI-1129 2-Wire Dual 4×32 Matrix Topology

The <u>NI SCXI-1339</u> terminal block provides connections to the NI SCXI-1129 in the <u>2-wire</u> dual 4×32 <u>matrix</u> topology. The following figure represents the NI SCXI-1129 in the 2-wire dual 4×32 matrix topology.



Legend: Software Name (Hardware Name)

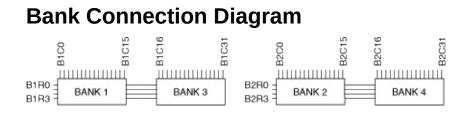
The SCXI-1129 in this topology contains two banks of 4×32 matrices. You can only connect rows and columns to rows and columns in the same bank.

For example, you can connect b1r1 to b1c0; however, you cannot connect b1r1 directly to b2c1 in this topology. When connecting signals for b1r1, connect them to B1R1H and B1R1L in the terminal block. When connecting signals for b1c0, you would connect them to B1C0H and B1C0L in the terminal block.

Notice you can connect to the <u>high-voltage analog bus (HVAB</u>) for routing signals to the back of the switch module.

You can connect the channels of the NI SCXI-1129 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect bank 1 row 1 to bank 1 column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to b1r1 and the **channel 2** parameter set to b1c1.

When scanning the NI SCXI-1129, a typical scan list entry could be $b_{1r1-b_1c_1}$; This entry routes the signal connected to bank 1 row 1 to bank 1 column 1.



Terminal Block Connections

The SCXI-1339 terminal block creates the following connections to operate the NI SCXI-1129 as a 2-wire dual 4×32 matrix. Refer to the <u>Pinout</u> section below for pin locations.

Connection	Pins
1	b1r0+ to b2r0+
2	b1r0- to b2r0-
3	b1r1+ to b2r1+
4	b1r1- to b2r1-
5	b1r2+ to b2r2+
6	b1r2- to b2r2-
7	b1r3+ to b2r3+
8	b1r3- to b2r3-
9	b3r0+ to b4r0+
10	b3r0- to b4r0-
11	b3r1+ to b4r1+
12	b3r1- to b4r1-
13	b3r2+ to b4r2+
14	b3r2- to b4r2-
15	b3r3+ to b4r3+
16	b3r3- to b4r3-

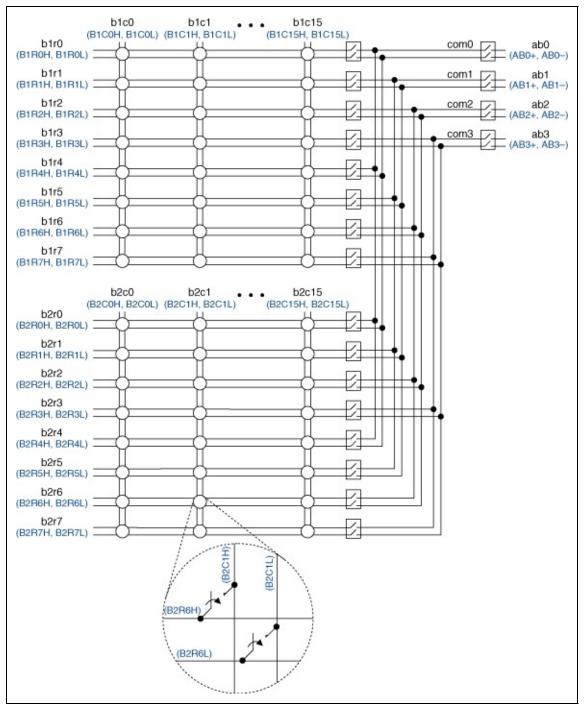
Pinout

The following figure identifies the pins for the NI SCXI-1129.

Pin	Signal		Colum		Signal
Number	Name	A	вс	D	Name
15	TBEECLK			-	GND
45	TBEEOUT TBEEEN		76	-	BMOIS* NC
44	SCANADV EXTRIG1	+	72	<u> </u>	INTERLOCK +5 V
43	NC	+0	7	-	NC
42	NC NC	-	7	-	NC NC
41	NC NC		7	-	NC NC
40	B2C15-		72	-	B4C15- B4C15+
39	B2C15+ B2C14-	_	72	-	B4C14-
	B2C14+ B2C13-	<u> </u>		-	B4C14+ B4C13-
38	B2C13+ B2C12-	-	76	<u> </u>	B4C13+ B4C12-
37	B2C12+ B2C11-	10	7	<u> </u>	B4C12+ B4C11-
36	B2C11+	+0	7	<u> </u>	B4C11+
35	B2C10- B2C10+	-0	7	-	B4C10- B4C10+
34	B2C9- B2C9+		72	~	B4C9- B4C9+
33	B2C8-		72	-	B4C8- B4C8+
	B2C8+ B2C7-		75		B4C7-
32	B2C7+ B2C6-			-	B4C7+ B4C6-
31	B2C6+ B2C5-		7	<u> </u>	B4C6+ B4C5-
30	B2C5+	+	99	<u> </u>	B4C5+
29	B2C4- B2C4+	-+0	7	0	B4C4- B4C4+
28	B2C3- B2C3+		72	~	B4C3- B4C3+
27	B2C2- B2C2+		72	-	B4C2- B4C2+
26	B2C1-		7		B4C1-
	B2C1+ B2C0-	10		-	B4C1+ B4C0-
25	B2C0+ B2R3-		70	°	B4C0+ B4R3-
24	B2R3+ B2R2-	+	32	<u> </u>	B4R3+ B4R2-
23	B2R2+	-0	76	-	B4R2+
22	B2R1- B2R1+	-	72	~	B4R1- B4R1+
21	B2R0- B2R0+	-	7	-	B4R0- B4R0+
20	B1C15- B1C15+		7	-	B3C15- B3C15+
19	B1C14-	_	7		B3C14-
10000	B1C14+ B1C13-			-	B3C14+ B3C13-
18	B1C13+ B1C12-	-	30	•	B3C13+ B3C12-
17	B1C12+	+	99	<u> </u>	B3C12+
16	B1C11- B1C11+	-0	7	-	B3C11- B3C11+
15	B1C10- B1C10+		72	-	B3C10- B3C10+
14	B1C9- B1C9+	+	72	-	B3C9- B3C9+
13	B1C8-		72		B3C8-
12	B1C8+ B1C7-	-	72	-	B3C8+ B3C7-
	B1C7+ B1C6-			<u> </u>	B3C7+ B3C6-
11	B1C6+ B1C5-	-	72	<u> </u>	B3C6+ B3C5-
10	B1C5+	-+0	7	~	B3C5+
9	B1C4- B1C4+	-	72	-	B3C4- B3C4+
8	B1C3- B1C3+	-	72	-	B3C3- B3C3+
7	B1C2- B1C2+		72	-	B3C2- B3C2+
6	B1C1-		72		B3C1-
23	B1C1+ B1C0-	1		-	B3C1+ B3C0-
5	B1C0+ B1R3-	<u> </u>	36	-	B3C0+ B3R3-
4	B1R3+	-	92	<u>+</u>	B3R3+
3	B1R2- B1R2+	-	72	0	B3R2- B3R2+
2	B1R1- B1R1+	-	72	-	B3R1- B3R1+
1	B1R0- B1R0+		72	-	B3R0- B3R0+
	enter	Ľ			

NI SCXI-1129 2-Wire Dual 8×16 Matrix Topology

The <u>NI SCXI-1337</u> terminal block provides connections to the NI SCXI-1129 in the <u>2-wire</u> dual 8×16 <u>matrix</u> topology. The following figure represents the NI SCXI-1129 in the 2-wire dual 8×16 matrix topology.



Legend: Software Name (Hardware Name)

The SCXI-1129 in this topology contains two banks of 8×16 matrices. You can only connect rows and columns to rows and columns in the same bank.

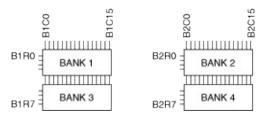
For example, you can connect b1r1 to b1c0; however, you cannot connect b1r1 directly to b2c1 in this topology. When connecting the signal for b1r1, connect your lead to B1R1H and B1R1L in the terminal block. When connecting the signal for b1c0, connect your lead to B1C0H and B1C0L in the terminal block.

Notice you can connect to the <u>high-voltage analog bus (HVAB</u>) for routing signals to the back of the switch module.

You can connect the channels of the NI SCXI-1129 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect bank 1 row 1 to bank 1 column 1, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to b1r1 and the **channel 2** parameter set to b1c1.

When scanning the NI SCXI-1129, a typical scan list entry could be b1r1-b1c1;. This entry routes the signal connected to bank 1 row 1 to bank 1 column 1.

Bank Connection Diagram



Terminal Block Connections

The SCXI-1337 terminal block creates the following connections or relabels pins to operate the NI SCXI-1129 as a dual 2-wire 8×16 matrix. Refer to the pinout for pin locations.

Connection	Pins
B1R4H	B3R4H
B1R4L	B3R4L
B1R5H	B3R5H
B1R5L	B3R5L
B1R6H	B3R6H
B1R6L	B3R6L
B1R7H	B3R7H
B1R7L	B3R7L
B2R4H	B4R4H
B2R4L	B4R4L
B2R5H	B4R5H
B2R5L	B4R5L
B2R6H	B4R6H
B2R6L	B4R6L
B2R7H	B4R7H
B2R7L	B4R7L
B1C0H	B1C0+ to B3C0+
B1C0L	B1C0- to B3C0-
B1C1H	B1C1+ to B3C1+
B1C1L	B1C1- to B3C1-
B1C2H	B1C2+ to B3C2+
B1C2L	B1C2- to B3C2-
B1C3H	B1C3+ to B3C3+
B1C3L	B1C3- to B3C3-

B1C4H	B1C4+ to B3C4+
B1C4L	B1C4- to B3C4-
B1C5H	B1C5+ to B3C5+
B1C5L	B1C5- to B3C5-
B1C6H	B1C6+ to B3C6+
B1C6L	B1C6- to B3C6-
B1C7H	B1C7+ to B3C7+
B1C7L	B1C7- to B3C7-
B1C8H	B1C8+ to B3C8+
B1C8L	B1C8- to B3C8-
B1C9H	B1C9+ to B3C9+
B1C9L	B1C9- to B3C9-
B1C10H	B1C10+ to B3C10+
B1C10L	B1C10- to B3C10-
B1C11H	B1C11+ to B3C11+
B1C11L	B1C11- to B3C11-
B1C12H	B1C12+ to B3C12+
B1C12L	B1C12- to B3C12-
B1C13H	B1C13+ to B3C13+
B1C13L	B1C13- to B3C13-
B1C14H	B1C14+ to B3C14+
B1C14L	B1C14- to B3C14-
B1C15H	B1C15+ to B3C15+
B1C15L	B1C15- to B3C15-
B2C0H	B2C0+ to B4C0+
B2C0L	B2C0- to B4C0-
B2C1H	B2C1+ to B4C1+
B2C1L	B2C1- to B4C1-
B2C2H	B2C2+ to B4C2+
B2C2L	B2C2- to B4C2-

B2C3H	B2C3+ to B4C3+
B2C3L	B2C3- to B4C3-
B2C4H	B2C4+ to B4C4+
B2C4L	B2C4- to B4C4-
B2C5H	B2C5+ to B4C5+
B2C5L	B2C5- to B4C5-
B2C6H	B2C6+ to B4C6+
B2C6L	B2C6- to B4C6-
B2C7H	B2C7+ to B4C7+
B2C7L	B2C7- to B4C7-
B2C8H	B2C8+ to B4C8+
B2C8L	B2C8- to B4C8-
B2C9H	B2C9+ to B4C9+
B2C9L	B2C9- to B4C9-
B2C10H	B2C10+ to B4C10+
B2C10L	B2C10- to B4C10-
B2C11H	B2C11+ to B4C11+
B2C11L	B2C11- to B4C11-
B2C12H	B2C12+ to B4C12+
B2C12L	B2C12- to B4C12-
B2C13H	B2C13+ to B4C13+
B2C13L	B2C13- to B4C13-
B2C14H	B2C14+ to B4C14+
B2C14L	B2C14- to B4C14-
B2C15H	B2C15+ to B4C15+
B2C15L	B2C15- to B4C15-

Pinout

The following figure identifies the pins for the NI SCXI-1129.

Pin	Signal		Colum		Signal
Number	Name	A	ВС	D	Name
45	TBEECLK				GND
45	TBEEOUT TBEEEN		76	-	BMOIS* NC
44	SCANADV EXTRIG1	+	76	<u> </u>	INTERLOCK +5 V
43	NC	+0	70	-	NC
42	NC NC	-	7	-	NC NC
41	NC NC	+	7	-	NC NC
40	B2C15-		72	-	B4C15- B4C15+
39	B2C15+ B2C14-	_	75	-	B4C14-
38	B2C14+ B2C13-	<u> </u>		-	B4C14+ B4C13-
15.0.00	B2C13+ B2C12-	-0	76	-	B4C13+ B4C12-
37	B2C12+ B2C11-	10	70	°	B4C12+ B4C11-
36	B2C11+	+	7	-	B4C11+
35	B2C10- B2C10+	-0	20	0	B4C10- B4C10+
34	B2C9- B2C9+	-	72	-	B4C9- B4C9+
33	B2C8-		72	-	B4C8- B4C8+
	B2C8+ B2C7-		75	-	B4C7-
32	B2C7+ B2C6-	10		-	B4C7+ B4C6-
31	B2C6+ B2C5-	10	7	<u> </u>	B4C6+ B4C5-
30	B2C5+	+	99	-	B4C5+
29	B2C4- B2C4+	-0	70	0	B4C4- B4C4+
28	B2C3- B2C3+		72	~	B4C3- B4C3+
27	B2C2- B2C2+		72	-	B4C2- B4C2+
26	B2C1-	_	7		B4C1-
	B2C1+ B2C0-	10		-	B4C1+ B4C0-
25	B2C0+ B2R3-		70	•	B4C0+ B4R3-
24	B2R3+	+	76	0	B4R3+ B4R2-
23	B2R2- B2R2+	-0	76	0	B4R2+
22	B2R1- B2R1+	-	72	~	B4R1- B4R1+
21	B2R0- B2R0+	+	7	-	B4R0- B4R0+
20	B1C15- B1C15+		7	-	B3C15- B3C15+
19	B1C14-		7	-	B3C14-
22505	B1C14+ B1C13-	1		~	B3C14+ B3C13-
18	B1C13+ B1C12-	-	70	•	B3C13+ B3C12-
17	B1C12+	+	99	-	B3C12+
16	B1C11- B1C11+	-0	7	0	B3C11- B3C11+
15	B1C10- B1C10+	+	72	-	B3C10- B3C10+
14	B1C9- B1C9+	+	72	-	B3C9- B3C9+
13	B1C8-		72		B3C8-
12	B1C8+ B1C7-	1		-	B3C8+ B3C7-
	B1C7+ B1C6-	-	36	-	B3C7+ B3C6-
11	B1C6+ B1C5-	-	92	<u> </u>	B3C6+ B3C5-
10	B1C5+	+	76	◦ +	B3C5+
9	B1C4- B1C4+	-	7	-	B3C4- B3C4+
8	B1C3- B1C3+	-	72	-	B3C3- B3C3+
7	B1C2-		72	-	B3C2- B3C2+
6	B1C2+ B1C1-		72		B3C1-
23	B1C1+ B1C0-	1		-	B3C1+ B3C0-
5	B1C0+ B1R3-	-	7	<u> </u>	B3C0+ B3R3-
4	B1R3+	-	92	<u></u>	B3R3+
3	B1R2- B1R2+	-	72	0	B3R2- B3R2+
2	B1R1- B1R1+	-	72	-	B3R1- B3R1+
1	B1R0- B1R0+		75	-	B3R0- B3R0+
	511.01				

Matrix Expansion

Matrices of the NI SCXI-1129 can be expanded in two ways: by expanding columns and by expanding rows.

To expand columns, use the matrix expansion cable that connects directly into the terminal block. Each expansion cable can route four pairs of signals from one terminal block to the next. To form an 8×64 matrix using NI SCXI-1335 terminal blocks, connect two SCXI-1335 terminal blocks using one matrix expansion cable.

To expand rows, use the matrix plugs that connect to the top of selected terminal blocks. To form a 32x16 matrix using NI SCXI-1336, simply connect one matrix expansion plug on the top or the bottom of two adjacent SCXI-1336 terminal blocks.

Terminal Block	0	Column Expansion Via Row Connection	Row Expansion Via Column Connection
NI SCXI- 1333	Quad 4×16	No	Yes, with matrix expansion plug. Examples: quad 8×16, quad 16×16, and so on.
NI SCXI- 1334	4×64	Yes, with HVAB or matrix expansion cable. Examples: 4×128, 4×256, and so on.	Yes, with matrix expansion plug. Examples: 8×64, 16×64, 32×64, and so on.
NI SCXI- 1335	8×32	Yes, with two matrix expansion cables. Examples: 8×64, 8×128, and so on.	Yes, with matrix expansion plug. Examples: 16×32, 32×32, and so on.
NI SCXI- 1336	16×16	No	Yes, with matrix expansion plug. Examples: 32×16, 64×16, and so on.
NI SCXI- 1337	Dual 8×16	No	No

NI SCXI-	Quad 4×32	No	No
1339			

Refer to Application Note 174 at <u>ni.com/zone</u> and the terminal block installation instructions for additional information.

NI SCXI-1129 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI SCXI-1129.

Trigger Input	Software	На
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	EXTT any te block
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 adapt SCXI- 1357/
Front	Front Connector Module 1	Front

Connector Module 1	(NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	termir of the Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front termir of the Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front termir of the Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front termir of the Slot 4
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Front termir of the Slot 5
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Front termir of the Slot 6
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Front termir of the Slot 7
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Front termir of the Slot 8
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Front termir of the Slot 9
Front	Front Connector Module 10	Front

Connector Module 10	(NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	termi of the Slot 1
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Front termi of the Slot 2
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front termi of the Slot 1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 adap SCXI 1357 conne the m Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 6 adap SCXI 1357 conne the m Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 adap SCXI 1357 conne the m Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 adap SCXI 1357 conn

		the Slo
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin ada SC 135 cor the Slo
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin ada SC 135 cor the Slo
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin ada SC 135 cor the Slo
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin ada SC 135 cor the Slo
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin ada SC 135 cor the Slo

Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 6 adapt SCXI- 1357/ conne the m Slot 1

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI SCXI-1129.

Scan Advanced Output	Software	Hard
None	None (NISWITCH_VAL_NONE)	N/A
TTLO	TTL0 (NISWITCH_VAL_TTL0)	SCXI trigge line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI trigge line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI trigge line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI trigge line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI trigge line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI trigge line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI trigge line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI trigge line 7
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	SCAN ADV (

		any termii block
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front panel termin block the modu Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front panel termin block the modu Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front panel termin block the modu Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front panel termin block the modu Slot 4
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Front panel termin block the modu

		Slot
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Fron pane term bloc the mod Slot
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Fron pane term bloc the mod Slot
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Fron pane term bloc the mod Slot
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Fron pane term block the mod Slot
Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Fron pane term block the mod Slot
Front	Front Connector Module 11	Fron

Connector Module 11	(NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	panel termir block the modu Slot 1
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front panel termir block the modu Slot 1

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1129 Relay Replacement

The NI SCXI-1129 uses electromechanical armature relays.

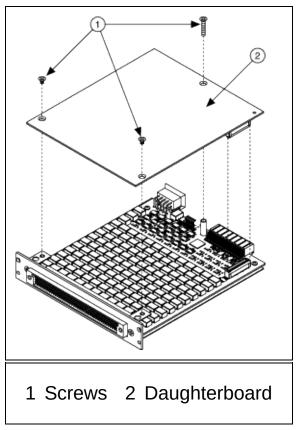
Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
Aromat (NAiS)	AGQ200A4H (HVAB relays)
	AGQ210A4H (row-column relays)

Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

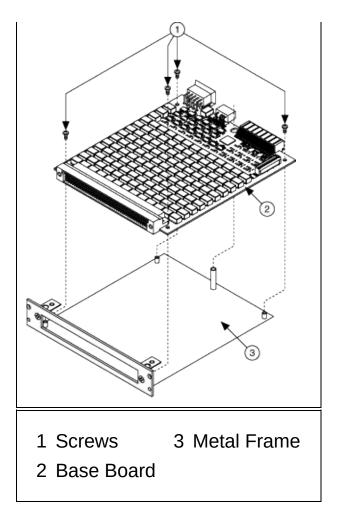
Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the three screws that secure the daughterboard to the switch assembly.



3. Remove the four screws that secure the base board to the metal frame.





- 4. Locate the relay you want to replace.
 - a. Determine the channel name for the relay using the Bank Connection Diagram for your topology.
 - b. Use the channel name to locate the relay using the following figures.

Top Base Board

B1R0C0	B1R1C0	B1R2C0	B1R3C0	B2R0C0	B2R1C0	B2R2C0	B2R3C0	B3R0C7	B3R1C7	B3R2C7	B3R3C7	B4R0C0
B1R0CB	B1R1C8	B1R2C8	B1R3C8	B2FI0C8	B2R1C8	B2R2C8	B2R3C8	B3R0C15	B3R1C15	B3R2C15	B3R3C15	B4R0C8
B1R0C1	B1R1C1	B1R2C1	B1R9C1	B2R0C1	B2R1C1	B2R2C1	B2R3C1	B3R0C6	B3R1C8	B3R2C8	B3R3C6	B4R0C1
B1R0C2	B1R1C2	B1R2C2	B1R3C2	B2R0C2	B2R1C2	B2R2C2	B2R3C2	B3R0C5	B3R1C5	B3R2C5	B3R3C5	B4R0C2
B1R0C3	B1R1C3	B1R2C3	B1R3C3	B2R0C3	B2R1C3	B2R2C3	B2R3C3	B3R0C4	B3R1C4	B3R2C4	B3R3C4	B4R0C3
B1R0C4	B1R1C4	B1R2C4	B1R3C4	B2R0C4	B2R1C4	B2R2C4	B2R3C4	B3R0C3	B3R1C3	B3R2C3	B3R3C3	B4R0C4
B1R0C5	B1R1C5	B1R2C5	B1R3C5	B2R0C5	B2R1C5	B2R2C5	B2R3C5	B3R0C2	B3R1C2	B3R2C2	B3R3C2	B4R0C5
B1R0C6	B1R1C6	B1R2C6	B1R3C6	B2R0C6	B2R1C6	B2R2C6	B2R3C6	B3R0C1	B3R1C1	B3R2C1	B3R3C1	B4R0C6
B1R0C7	B1R1C7	B1R2C7	B1R3C7	B2R0C7	B2R1C7	B2R2C7	B2R3C7	B3R0C0	B3R1C0	B3R2C0	B3R3C0	B4R0C7
B1C0N1	B1C0N2	B1C0N3	B1C0N4	B2C0N1	B2C0N2	B2C0N3	B2C0N4	B3C0N1	B3C0N2	B3C0N3	B3C0N4	B4C0N1
	B4R2C2	B4R2C1	B4R2C0	B4C0N2	B4R1C7	B4R1C6	B4R1C5	B4R1C4	B4R1C3	B4R1C2	B4R1C1	B4R1C0
	B4R2C7	B4R2C6	B4R2C5	B4R2C4								HVAB1
	B4C0N3	B4R3C8	B4C0N4	B4R3C7								HVAB0
									HVAB3			

Bottom Base Board

					,							
			B4R3C12	B4R3C11								
	B4R3C15	B4R3C14	B4R3C10	B4R3C9								
B4R2C3	B4R2C15	B4R2C14	B4R2C13	B4R3C13	B4R3C6	B4R3C5	B4R3C4	B4R3C3	B4R3C2	B4R9C1	B4R3C0	HVAB2
B4R2C11	B4R2C10	B4R2C9	B4R2C8	B4R2C12	B4R1C15	B4R1C14	B4R1C13	B4R1C12	B4R1C11	B4R1C10	B4R1C9	B4R1C8
B1R0C15	B1R1C15	B1R2C15	B1R3C15	B2R0C15	B2R1C15	B2R2C15	B2R3C15	B3R0C8	B3R1C8	B3R2C8	B3R3C8	B4R0C15
B1R0C14	B1R1C14	B1R2C14	B1R3C14	B2R0C14	B2R1C14	B2R2C14	B2R3C14	B3R0C9	B3R1C9	B3R2C9	B3R3C9	B4R0C14
B1R0C13	B1R1C13	B1R2C13	B1R3C13	B2R0C13	B2R1C13	B2R2C13	B2R3C13	B3R0C10	B3R1C10	B3R2C10	B3R3C10	B4R0C13
B1R0C12	B1R1C12	B1R2C12	B1R3C12	B2R0C12	B2R1C12	B2R2C12	B2R3C12	B3R0C11	B3R1C11	B3R2C11	B3R3C11	B4R0C12
B1R0C11	B1R1C11	B1R2C11	B1R3C11	B2R0C11	B2R1C11	B2R2C11	B2R3C11	B3R0C12	B3R1C12	B3R2C12	B3R3C12	B4R0C11
B1R0C10	B1R1C10	B1R2C10	B1R3C10	B2R0C10	B2R1C10	B2R2C10	B2R3C10	B3R0C13	B3R1C13	B3R2C13	B3R3C13	B4R0C10
B1R0C9	B1R1C9	B1R2C9	B1R9C9	B2FI0C9	B2R1C9	B2R2C9	B2R3C9	B3R0C14	B3R1C14	B3R2C14	B3R3C14	B4R0C9

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

NI SCXI-1130

The NI SCXI-1130 is a high-density <u>multiplexer/matrix</u> switch module for the SCXI platform. The NI SCXI-1130 uses <u>reed relays</u>. The NI SCXI-1130 does not support routing signals to the <u>high-voltage analog bus</u>.

A number of factors can affect the life expectancy of reed relays. Refer to <u>Reed Relay Protection</u> for information about protecting the reed relays of the NI SCXI-1130.

Operation Modes

The following table lists the supported topologies of the NI SCXI-1130 and possible <u>operation modes</u>.

Topology	Software Name
<u>1-Wire</u> <u>256×1</u> <u>Multiplexer</u>	1130/1-Wire 256x1 Mux (NISWITCH_TOPOLOGY_1130_1_WIRE_256X1_MUX)
<u>1-Wire Dual</u> <u>128×1</u> <u>Multiplexer</u>	1130/1-Wire Dual 128x1 Mux (NISWITCH_TOPOLOGY_1130_1_WIRE_DUAL_128X1_M
<u>1-Wire</u> Quad 64×1 Multiplexer	1130/1-Wire Quad 64x1 Mux (NISWITCH_TOPOLOGY_1130_1_WIRE_QUAD_64X1_MI
<u>1-Wire Octal</u> <u>32×1</u> Multiplexer	1130/1-Wire Octal 32x1 Mux (NISWITCH_TOPOLOGY_1130_1_WIRE_OCTAL_32X1_M
<u>1-Wire</u> <u>Sixteen</u> <u>16×1</u> <u>Multiplexer</u>	1130/1-Wire Sixteen 16x1 Mux (NISWITCH_TOPOLOGY_1130_1_WIRE_SIXTEEN_16X1_
2-Wire 128×1 Multiplexer	1130/2-Wire 128x1 Mux (NISWITCH_TOPOLOGY_1130_2_WIRE_128X1_MUX)
<u>2-Wire</u> Quad 32×1 Multiplexer	1130/2-Wire Quad 32x1 Mux (NISWITCH_TOPOLOGY_1130_2_WIRE_QUAD_32X1_MI
<u>2-Wire Octal</u> <u>16×1</u> Multiplexer	1130/2-Wire Octal 16x1 Mux (NISWITCH_TOPOLOGY_1130_2_WIRE_OCTAL_16X1_M
<u>4-Wire 64×1</u> <u>Multiplexer</u>	1130/4-Wire 64x1 Mux (NISWITCH_TOPOLOGY_1130_4_WIRE_64X1_MUX)
<u>4-Wire</u> Quad 16×1 Multiplexer	1130/4-Wire Quad 16x1 Mux (NISWITCH_TOPOLOGY_1130_4_WIRE_QUAD_16X1_MI

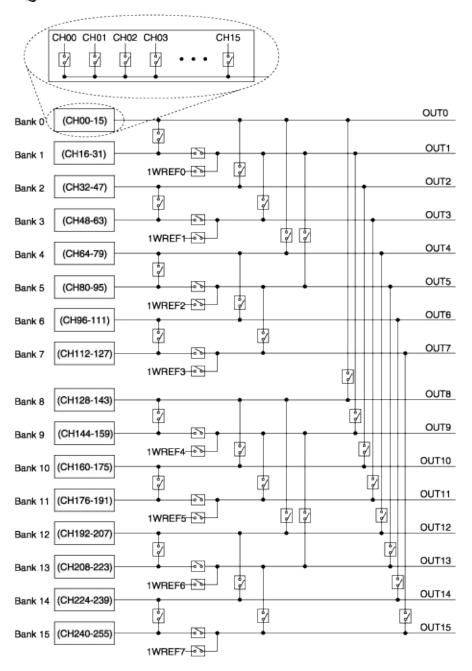
	1130/1-Wire 4x64 Matrix (NISWITCH_TOPOLOGY_1130_1_WIRE_4X64_MATRIX)
	1130/1-Wire 8x32 Matrix (NISWITCH_TOPOLOGY_1130_1_WIRE_8X32_MATRIX)
	1130/2-Wire 4x32 Matrix (NISWITCH_TOPOLOGY_1130_2_WIRE_4X32_MATRIX)
Independent	1130/Independent (NISWITCH_TOPOLOGY_1130_INDEPENDENT)

NI SCXI-1130 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1130.



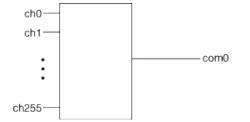
Note Refer to the <u>Independent Topology</u> section for relay names.



NI SCXI-1130 1-Wire 256×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>1-wire</u> 256×1 <u>multiplexer</u>. In this topology, channel terminals CH 00 through CH 255 route to OUT0. A reference, 1WREF0, always remains connected to OUT1, which is addressed as com0 in software. The pair, OUT0 and OUT1, is provided for convenient connectivity to a 2-wire device, such as a DMM.

The following figure represents the NI SCXI-1130 in the 1-wire 256×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

CH 02 connected to OUT0

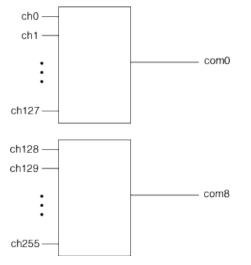
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI SCXI-1130 front connector pinout and NI SCXI-1377 terminal mapping.

NI SCXI-1130 1-Wire Dual 128×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>1-wire</u> dual 128×1 <u>multiplexer</u>. In this topology, channel terminals CH 00 through CH 127 route to OUT0. A reference, 1WREF0, always remains connected to OUT1, which is addressed as com0 in software. The pair, OUT0 and OUT1, is provided for convenient connectivity to a 2-wire device, such as a DMM. The other bank follows a similar routing scheme, with 1WREF4 connected to OUT9.

The following figure represents the NI SCXI-1130 in the 1-wire dual 128×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

CH 02 connected to OUT0

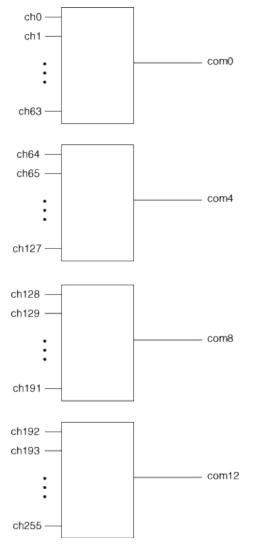
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI SCXI-1130 front connector pinout and NI SCXI-1377 terminal mapping.

NI SCXI-1130 1-Wire Quad 64×1 Multiplexer Topology

Use the NI SCXI-1377 terminal block with the NI SCXI-1130 as a <u>1-wire</u> quad 64×1 <u>multiplexer</u>. In this topology, channel terminals CH 00 through CH 63 route to OUT0. A reference, 1WREF0, always remains connected to OUT1, which is addressed as com0 in software. The pair, OUT0 and OUT1, is provided for convenient connectivity to a 2-wire device, such as a DMM. The other three banks follow a similar routing scheme, with 1WREF2 connected to OUT5, 1WREF4 connected to OUT9, and 1WREF6 connected to OUT13.

The following figure represents the NI SCXI-1130 in the 1-wire quad 64×1 multiplexer topology.



Making a Connection

Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

CH 02 connected to OUT0

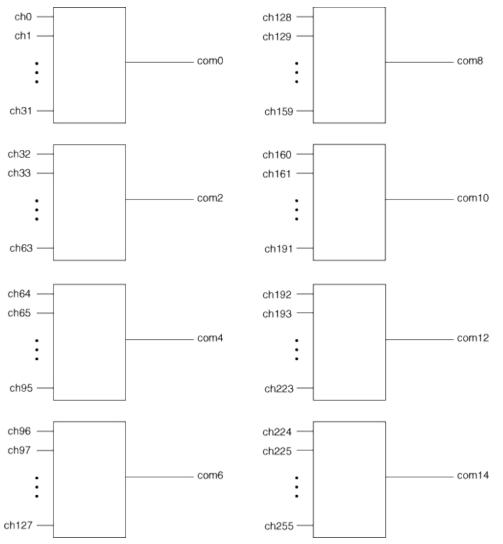
Signal Connections

Refer to the <u>Signal Connections</u> section for the NI SCXI-1130 front connector pinout and NI SCXI-1377 terminal mapping.

NI SCXI-1130 1-Wire Octal 32×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>1-wire</u> octal 32×1 <u>multiplexer</u>. In this topology, channel terminals CH 00 through CH 31 route to OUT0. A reference, 1WREF0, always remains connected to OUT1, which is addressed as com0 in software. The pair, OUT0 and OUT1, is provided for convenient connectivity to a 2-wire device, such as a DMM. The other seven banks follow a similar routing scheme, with 1WREF1 through 1WREF7 connected to the odd-numbered OUT terminals.

The following figure represents the NI SCXI-1130 in the 1-wire octal 32×1 multiplexer topology.



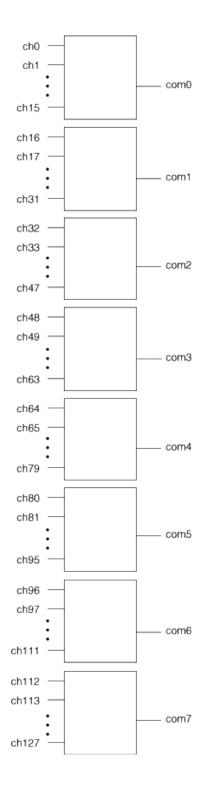
Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

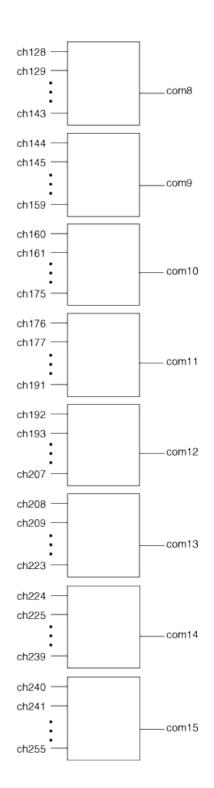
CH 02 connected to OUT0

NI SCXI-1130 1-Wire Sixteen 16×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as sixteen independent <u>1-wire</u> 16×1 <u>multiplexers</u>. In this topology, channel terminals CH 00 through CH 15 route to OUT0, which is addressed as com0 in software. The other fifteen banks follow a similar routing scheme.

The following figure represents the NI SCXI-1130 in the 1-wire sixteen 16×1 multiplexer topology.



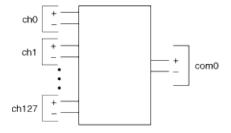


Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

CH 02 connected to OUT0

NI SCXI-1130 2-Wire 128×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>2-wire</u> 128×1 <u>multiplexer</u>. The following figure represents the NI SCXI-1130 in the 2-wire 128×1 multiplexer topology.



In <u>2-wire mode</u>, channel terminals CH 00 through CH 127 each have two differential leads. Each signal pair is routed through the NI SCXI-1130 and is available on the OUT0 and OUT1 screw terminals on the NI SCXI-1377. The OUT0 and OUT1 pair is addressed collectively as com0 in software.

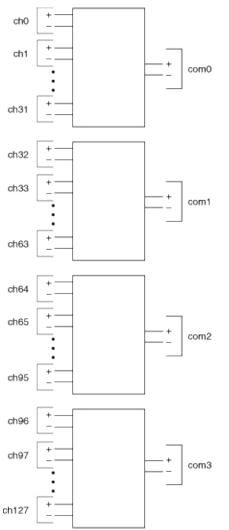
Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to CH 02 is routed to OUT0

signal connected to CH 18 is routed to OUT1

NI SCXI-1130 2-Wire Quad 32×1 Multiplexer Topology

Use the NI SCXI-1377 terminal block with the NI SCXI-1130 as a <u>2-wire</u> quad 32×1 <u>multiplexer</u>. The following figure represents the NI SCXI-1130 in the 2-wire quad 32×1 multiplexer topology.



In <u>2-wire mode</u>, channel terminals CH 00 through CH 31 each have two differential leads. Each signal pair is routed through the NI SCXI-1130 and is available on the OUT0 and OUT1 screw terminals on the NI SCXI-1377. The OUT0 and OUT1 pair is addressed collectively as com0 in software. The other three banks follow a similar routing scheme.

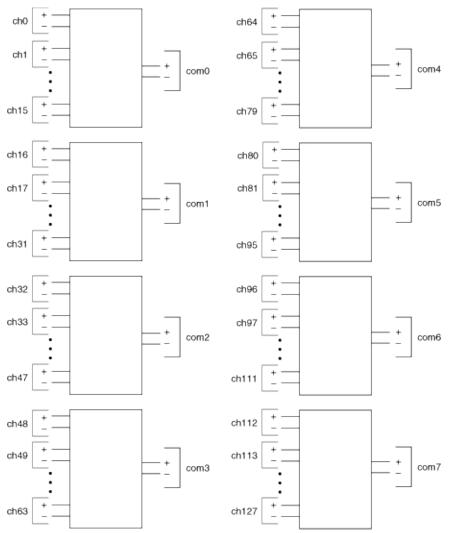
Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to CH 02 is routed to OUT0

signal connected to CH 18 is routed to OUT1

NI SCXI-1130 2-Wire Octal 16×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>2-wire</u> octal 16×1 <u>multiplexer</u>. The following figure represents the NI SCXI-1130 in the 2-wire octal 16×1 multiplexer topology.



In <u>2-wire mode</u>, channel terminals CH 00 through CH 15 each have two differential leads. Each signal pair is routed through the NI SCXI-1130 and is available on the OUT0 and OUT1 screw terminals on the NI SCXI-1377. The OUT0 and OUT1 pair is addressed collectively as com0 in software. The other seven banks follow a similar routing scheme.

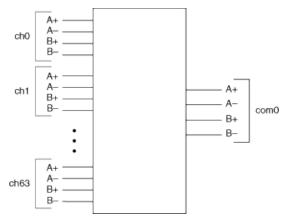
Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to CH 02 is routed to OUT0

signal connected to CH 18 is routed to OUT1

NI SCXI-1130 4-Wire 64×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>4-wire</u> 64×1 <u>multiplexer</u>. The following figure represents the NI SCXI-1130 in the 4-wire 64×1 multiplexer topology.



In <u>4-wire mode</u>, channel terminals CH 00 through CH 63 each have four leads that route in parallel to the OUT0, OUT1, OUT4, and OUT5 screw terminals on the NI SCXI-1377. OUT0, OUT1, OUT4, and OUT5 are addressed collectively as com0 in software.

Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to CH 02 is routed to OUT0

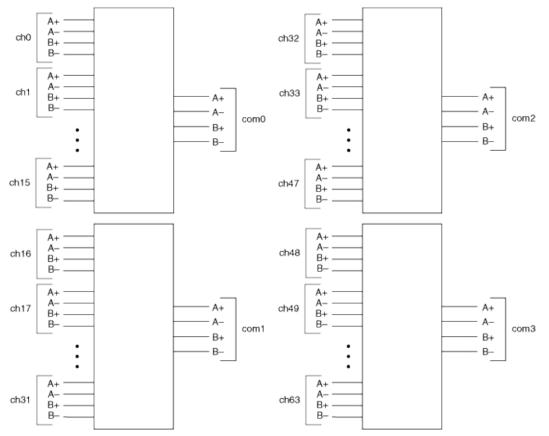
signal connected to CH 18 is routed to OUT1

signal connected to CH 66 is routed to OUT4

signal connected to CH 82 is routed to OUT5

NI SCXI-1130 4-Wire Quad 16×1 Multiplexer Topology

Use the <u>NI SCXI-1377</u> terminal block with the NI SCXI-1130 as a <u>4-wire</u> quad 16×1 <u>multiplexer</u>. The following figure represents the NI SCXI-1130 in the 4-wire quad 16×1 multiplexer topology.



In <u>4-wire mode</u>, channel terminals CH 00 through CH 15 each have four leads that route in parallel to the OUT0, OUT1, OUT4, and OUT5 screw terminals on the NI SCXI-1377. OUT0, OUT1, OUT4, and OUT5 are addressed collectively as com0 in software. The other three banks follow a similar routing scheme.

Both the scanning command, ch2->com0;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connections:

signal connected to CH 02 is routed to OUT0

signal connected to CH 18 is routed to OUT1

signal connected to CH 66 is routed to OUT4

signal connected to CH 82 is routed to OUT5

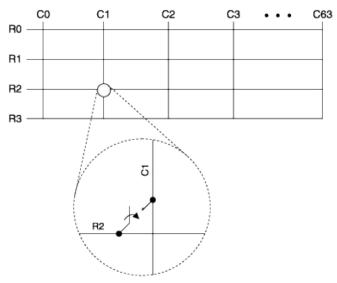
NI SCXI-1130 1-Wire 4×64 Matrix Topology

Use the NI SCXI-1378 terminal block with the NI SCXI-1130 as a $\frac{1-\text{wire}}{4\times64 \text{ matrix}}$.



Note This topology uses only even numbered rows in the NI SCXI-1378 terminal block.

The following figure represents the NI SCXI-1130 in the 1-wire 4×64 matrix topology.

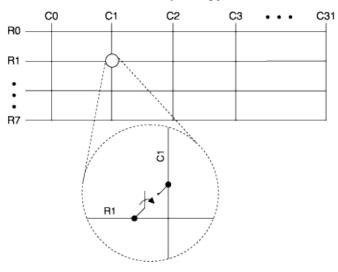


Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connection:

signal connected to R2 is routed to C1

NI SCXI-1130 1-Wire 8×32 Matrix Topology

Use the NI SCXI-1379 terminal block with the NI SCXI-1130 as a <u>1-wire</u> 8×32 <u>matrix</u>. The following figure represents the NI SCXI-1130 in the 1-wire 8×32 matrix topology.

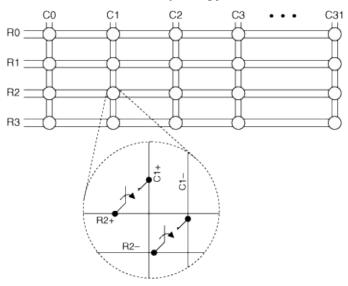


Both the scanning command, $r1 \rightarrow c1$;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r1 and c1, result in the following connection:

signal connected to R1 is routed to C1

NI SCXI-1130 2-Wire 4×32 Matrix Topology

Use the NI SCXI-1378 terminal block with the NI SCXI-1130 as a 2-wire 4×32 matrix. The following figure represents the NI SCXI-1130 in the 2-wire 4×32 matrix topology.



Both the scanning command, $r2 \rightarrow c1$;, and the immediate operation <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters r2 and c1, result in the following connections:

signal connected to R2+ is routed to C1+

signal connected to R2- is routed to C1-

NI SCXI-1130 Independent Topology

N

When using the NI SCXI-1130 in the independent topology, connect your signals using the NI SCXI-1377 terminal block. In this topology, you can utilize the full routing capabilities of the NI SCXI-1130.

Note When using the independent topology, always select NONE in MAX for the terminal block.

Сноо снот сног сног Эко Экт Экг Эг		
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		
Bank 0 (CH00-15)		СОМО
Bank 1 (CH16-31)	KBC02	COM1
Bank 2 (CH32-47)		COM2
Bank 3 (CH48-63) PCOM3	КВС04	сомз
Bank 4 (CH64-79)	KREF23	сом4
Bank 5 (CH80-95)	KCOM5	сом5
Bank 6 (CH96-111)	KREF45	соме
Bank 7 (CH112-127)	КСОМ7 КВС57	сом7
	KREF67	КАВВ
Bank 8 (CH128-143) KBC89	ксоме	КАВ9
Bank 9 (CH144-159) PCOM9	KBC810	КАВ10
Bank 10 (CH160-175) KBC1011		COM10
Bank 11 (CH176-191) PCOM11	КВС812 КВС913	СОМ11
Bank 12 (CH192-207)	KREF1011	COM12
Bank 13 (CH208-223)		KAB14
Bank 14 (CH224-239)	KREF1213	COM14
KBC1415 Bank 15 (CH240-255) PCOM15	КСОМ15 КВС1315	KAB15
Daik 15 (OIETOED)	-69- KREF1415	000013

When using the independent topology, you can control the individual relays using the <u>niSwitch Relay Control</u> VI or the <u>niSwitch RelayControl</u> function, or you can use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function.

NI SCXI-1130 Signal Connections

Note When connecting a custom terminal block or cable to the NI SCXI-1130, you must incorporate the interlock scheme into the terminal block/cable. On the bottom front connector of the NI SCXI-1130, connect the TB_DETECT pin (88) signal to a ground pin (42, 86, 174, or 130) to incorporate the interlock scheme.

This book contains the pinout and signal connection information for the following types of topologies of the NI SCXI-1130:

- <u>1-Wire Multiplexer Topologies</u>
- 2-Wire Multiplexer Topologies
- <u>4-Wire Multiplexer Topologies</u>
- <u>1-Wire 4x64 Matrix Topology</u>
- <u>1-Wire 8x32 Matrix Topology</u>
- 2-Wire 4x32 Matrix Topology
- Independent Topology

NI SCXI-1130 1-Wire Multiplexer and Independent Topologies

The following figure and table identify the pins for the NI SCXI-1130 in the 1-wire multiplexer and independent topologies.

		_	_	_		1	
133 -	00	f•	Î	ľ	0-	45	- 1
134	89 -	•	ŗ	ŕ	0	- 45	- 2
135	90 -	-	ľ	Ľ	0-	- 46	- 3
136	91 -	•	j	Ľ	0	- 47	- 4
137	92 -	-	j	ŕ	0	- 48	- 5
138	93 -	•	j	Ĺ	0-	- 49	- 6
139	94 -	•	j	Ľ	0	- 50	- 7
140	95 -	•	j	Ľ	0	- 51	- 8
141	96 -	•	ŗ	Ľ	0	- 52	- 9
142	97 -	•	ľ	Ĺ	0-	- 53	- 10
143 -	98 -	•	ľ	Ľ	D-	- 54	- 11
144	99 -	-	_	Ľ	0	- 55	- 12
145	100 -	•	Ľ	Ľ	0	- 56	- 13
146	101 -	5	j	Ľ	0	- 57	- 14
147	102 -		ļ	Ľ	0-	- 58	- 15
148	103 -		ľ	Ľ	0-	- 59	- 16
149	104 -	-	ľ		0-	- 60	- 17
150	105 -	-	_	Ĺ	0	- 61	- 18
151	106 -		Ĵ	Ĺ	-	- 62	- 19
152	107 -	0	ļ	Ĺ	0-	- 63	- 20
153 -	108 -	-	Ĵ	Ĺ	0	- 64	- 21
154	109 -	Ē	Ĵ	Ĺ		- 65	- 22
155	110 -		Ĵ	Ĺ		- 66	- 23
	111 -	°	ľ	Ĺ	0-	- 67	- 24
156	112 -	•	Ľ	Ĺ	0-	- 68	- 24
157	113 -	P.	ſ	Ĺ		- 69	
158	114 -	P.	Ľ	Ĺ		- 70	- 26
159 -	115 -	P.	ſ	Ĺ	0	- 71	- 27
160	116 -	•	Ĵ	Ĺ	0-	- 72	- 28
161	117 -	°.	ſ	Ĺ	0	- 73	- 29
162	118 -	°	Ĵ	Ĺ	0-	- 74	- 30
163	119 -	°	Ĵ	Ĺ	-	- 75	- 31
164	120 -	P	Ĵ	Ľ	0	- 76	- 32
165	121 -	°.	Ĵ	Ĺ	0	- 77	- 33
166	122 -	P.	Ĵ	Ĺ	0-	- 78	- 34
167	123 -	P.	Ĵ	Ĺ	0	- 79	- 35
168	124 -	•	Ĵ	Ľ	0-	- 80	- 36
169	125 -	°	Ĵ	Ĺ	D-	- 81	- 37
170	126 -	•	Ĵ	Ľ	0-	- 82	- 38
171 -	127 -	1	Ĵ	Ĺ	Þ	- 83	- 39
172 ·	128 -	•	Ĵ	Ĺ	0	- 84	- 40
173 ·	129 -	•	ĵ	Ĺ	0	- 85	- 41
174	130 -	•	Ĵ	Ľ	•	- 86	- 42
175 ·	131 -	°	ĵ	Ĺ	0	- 87	- 43
176 ·	132 -	•	Ĵ	Ĺ	0	- 88	- 44
	102					00	
			_	_)	

Single 256x1	Dual 128x1	Quad 64x1	Octal 32x1	Sixteen 16x1	Independent	Connector Location	Pin Numbe
com0	com0	com0	com0	com0	com0	Тор	141
				com1	com1	Тор	97
			com2	com2	com2	Тор	114
				com3	com3	Тор	159
		com4	com4	com4	com4	Тор	9
				com5	com5	Тор	53
			com6	com6	com6	Тор	70
				com7	com7	Тор	27
	com8	com8	com8	com8	com8	Bottom	141
				com9	com9	Bottom	97
			com10	com10	com10	Bottom	114
				com11	com11	Bottom	159
		com12	com12	com12	com12	Bottom	9
				com13	com13	Bottom	53
			com14	com14	com14	Bottom	70
				com15	com15	Bottom	27
					1wref0	Тор	150
					1wref1	Тор	123
					1wref2	Тор	18
					1wref3	Тор	79
					1wref4	Bottom	150
					1wref5	Bottom	123
					1wref6	Bottom	18
					1wref7	Bottom	79
			ch0			Тор	133
			ch1			Тор	89
			ch2			Тор	134
ch3					Тор	90	

ch4	Тор	135
ch5	Тор	91
ch6	Тор	136
ch7	Тор	92
ch8	Тор	137
ch9	Тор	93
ch10	Тор	138
ch11	Тор	94
ch12	Тор	139
ch13	Тор	95
ch14	Тор	140
ch15	Тор	96
ch16	Тор	142
ch17	Тор	98
ch18	Тор	143
ch19	Тор	99
ch20	Тор	144
ch21	Тор	100
ch22	Тор	145
ch23	Тор	101
ch24	Тор	146
ch25	Тор	102
ch26	Тор	147
ch27	Тор	103
ch28	Тор	148
ch29	Тор	104
ch30	Тор	149
ch31	Тор	105
ch32	Тор	106
ch33	Тор	151

ch34	Тор	107
ch35	Тор	152
ch36	Тор	108
ch37	Тор	153
ch38	Тор	109
ch39	Тор	154
ch40	Тор	110
ch41	Тор	155
ch42	Тор	111
ch43	Тор	156
ch44	Тор	112
ch45	Тор	157
ch46	Тор	113
ch47	Тор	158
ch48	Тор	115
ch49	Тор	160
ch50	Тор	116
ch51	Тор	161
ch52	Тор	117
ch53	Тор	162
ch54	Тор	118
ch55	Тор	163
ch56	Тор	119
ch57	Тор	164
ch58	Тор	120
ch59	Тор	165
ch60	Тор	121
ch61	Тор	166
ch62	Тор	122
ch63	Тор	167

ch64	Тор	1
ch65	Тор	45
ch66	Тор	2
ch67	Тор	46
ch68	Тор	3
ch69	Тор	47
ch70	Тор	4
ch71	Тор	48
ch72	Тор	5
ch73	Тор	49
ch74	Тор	6
ch75	Тор	50
ch76	Тор	7
ch77	Тор	51
ch78	Тор	8
ch79	Тор	52
ch80	Тор	10
ch81	Тор	54
ch82	Тор	11
ch83	Тор	55
ch84	Тор	12
ch85	Тор	56
ch86	Тор	13
ch87	Тор	57
ch88	Тор	14
ch89	Тор	58
ch90	Тор	15
ch91	Тор	59
ch92	Тор	16
ch93	Тор	60

ch94	Тор	17
ch95	Тор	61
ch96	Тор	62
ch97	Тор	19
ch98	Тор	63
ch99	Тор	20
ch100	Тор	64
ch101	Тор	21
ch102	Тор	65
ch103	Тор	22
ch104	Тор	66
ch105	Тор	23
ch106	Тор	67
ch107	Тор	24
ch108	Тор	68
ch109	Тор	25
ch110	Тор	69
ch111	Тор	26
ch112	Тор	71
ch113	Тор	28
ch114	Тор	72
ch115	Тор	29
ch116	Тор	73
ch117	Тор	30
ch118	Тор	74
ch119	Тор	31
ch120	Тор	75
ch121	Тор	32
ch122	Тор	76
ch123	Тор	33

ch124	Тор	77
ch125	Тор	34
ch126	Тор	78
ch127	Тор	35
ch128	Bottom	133
ch129	Bottom	89
ch130	Bottom	134
ch131	Bottom	90
ch132	Bottom	135
ch133	Bottom	91
ch134	Bottom	136
ch135	Bottom	92
ch136	Bottom	137
ch137	Bottom	93
ch138	Bottom	138
ch139	Bottom	94
ch140	Bottom	139
ch141	Bottom	95
ch142	Bottom	140
ch143	Bottom	96
ch144	Bottom	142
ch145	Bottom	98
ch146	Bottom	143
ch147	Bottom	99
ch148	Bottom	144
ch149	Bottom	100
ch150	Bottom	145
ch151	Bottom	101
ch152	Bottom	146
ch153	Bottom	102

ch154	Bottom	147
ch155	Bottom	103
ch156	Bottom	148
ch157	Bottom	104
ch158	Bottom	149
ch159	Bottom	105
ch160	Bottom	106
ch161	Bottom	151
ch162	Bottom	107
ch163	Bottom	152
ch164	Bottom	108
ch165	Bottom	153
ch166	Bottom	109
ch167	Bottom	154
ch168	Bottom	110
ch169	Bottom	155
ch170	Bottom	111
ch171	Bottom	156
ch172	Bottom	112
ch173	Bottom	157
ch174	Bottom	113
ch175	Bottom	158
ch176	Bottom	115
ch177	Bottom	160
ch178	Bottom	116
ch179	Bottom	161
ch180	Bottom	117
ch181	Bottom	162
ch182	Bottom	118
ch183	Bottom	163

ch184	Bottom	119
ch185	Bottom	164
ch186	Bottom	120
ch187	Bottom	165
ch188	Bottom	121
ch189	Bottom	166
ch190	Bottom	122
ch191	Bottom	167
ch192	Bottom	1
ch193	Bottom	45
ch194	Bottom	2
ch195	Bottom	46
ch196	Bottom	3
ch197	Bottom	47
ch198	Bottom	4
ch199	Bottom	48
ch200	Bottom	5
ch201	Bottom	49
ch202	Bottom	6
ch203	Bottom	50
ch204	Bottom	7
ch205	Bottom	51
ch206	Bottom	8
ch207	Bottom	52
ch208	Bottom	10
ch209	Bottom	54
ch210	Bottom	11
ch211	Bottom	55
ch212	Bottom	12
ch213	Bottom	56

ch214	Bottom	13
ch215	Bottom	57
ch216	Bottom	14
ch217	Bottom	58
ch218	Bottom	15
ch219	Bottom	59
ch220	Bottom	16
ch221	Bottom	60
ch222	Bottom	17
ch223	Bottom	61
ch224	Bottom	62
ch225	Bottom	19
ch226	Bottom	63
ch227	Bottom	20
ch228	Bottom	64
ch229	Bottom	21
ch230	Bottom	65
ch231	Bottom	22
ch232	Bottom	66
ch233	Bottom	23
ch234	Bottom	67
ch235	Bottom	24
ch236	Bottom	68
ch237	Bottom	25
ch238	Bottom	69
ch239	Bottom	26
ch240	Bottom	71
ch241	Bottom	28
ch242	Bottom	72
ch243	Bottom	29

ch244	Bottom	73
ch245	Bottom	30
ch246	Bottom	74
ch247	Bottom	31
ch248	Bottom	75
ch249	Bottom	32
ch250	Bottom	76
ch251	Bottom	33
ch252	Bottom	77
ch253	Bottom	34
ch254	Bottom	78
ch255	Bottom	35

NI SCXI-1130 2-Wire Multiplexer Topologies

The following figure and table identify the pins for the NI SCXI-1130 in the 2-wire multiplexer topologies.

		_	_	\neg		
133 -		f• 1	, P	~		- 1
134 -	89 -	•	_	0	- 45	- 2
135 -	90 -	• •		•	- 46	- 3
136 -	91 -	•		0	- 47	4
137 -	92 -			0	- 48	- 5
138 -	93 -			-	- 49	- 6
139 -	94 -	\vdash		0	- 50	- 7
140 -	95 -			0	- 51	- 8
141 -	96 -	\vdash		0	- 52	- 9
142 -	97 -	\vdash		•	- 53	- 10
143 -	98 -	\vdash		-+	- 54	- 11
144 -	99 -		_	0	- 55	
	100 -	•		•	- 56	- 12
145 -	101 -	-		•	- 57	- 13
146 -	102 -			•	- 58	- 14
147 -	103 -	- 1		•	- 59	- 15
148 -	104 -	2		•	- 60	- 16
149 -	105 -	- 1		•	- 61	17
150 -	106 -	<u> </u>	Ľ	•	- 62	- 18
151 -	107 -	• 1	Ľ	•	- 63	- 19
152 -	108 -	• •	Ľ	0	- 64	- 20
153 -		- 9	۲ Ľ	•		- 21
154 -	109 -	- 9		•	- 65	- 22
155 -	110 -			0	- 66	- 23
156 -	111 -	- 1		•	- 67	- 24
157 -	112 -			•	- 68	- 25
158 -	113 -			•	- 69	- 26
159 -	114 -			0	- 70	- 27
160 ·	115 -	•		•	- 71	- 28
161 -	116 -	-		•	- 72	- 29
162 -	117 -	•		-	- 73	- 30
163 -	118 -			•	- 74	- 31
164 -	119 -	\vdash		0	- 75	- 32
165 -	120 -	\vdash		0	- 76	- 33
166 -	121 -	-		•	- 77	- 34
	122 -	\vdash		-+	- 78	
167 -	123 -			•	- 79	- 35
168 -	124 -	•		•	- 80	- 36
169 -	125 -	• •		0	- 81	- 37
170 .	126 -	-		•	- 82	- 38
171 -	127 -	-		•	- 83	- 39
172 -	128 -	<u>م</u>		•	- 84	- 40
173 -	129 -	• •		0	- 85	- 41
174 -	130 -	- 1		•	- 86	42
175 -	131 -		Ľ	0	- 87	- 43
176 -		- 5	Ľ	•		- 44
	132 -				- 88	
		\subseteq	_			
				-		

Softv	ware Na	me		H	ardware	Name
Single	Quad	Octal	Polarity	Connector	Pin	NI SCXI-1377

128x1	32x1	16x1		Location	Number	Terminal Name
com0	com0	com0	+	Тор	141	OUT 0
			_	Тор	97	OUT 1
		com1	+	Тор	114	OUT 2
			_	Тор	159	OUT 3
	com1	com2	+	Тор	9	OUT 4
		-	_	Тор	53	OUT 5
		com3	+	Тор	70	OUT 6
			_	Тор	27	OUT 7
	com2	com4	+	Bottom	141	OUT 8
		-	_	Bottom	97	OUT 9
		com5	+	Bottom	114	OUT 10
			_	Bottom	159	OUT 11
	com3	com6	+	Bottom	9	OUT 12
		-	_	Bottom	53	OUT 13
		com7	+	Bottom	70	OUT 14
			_	Bottom	27	OUT 15
				Тор	150	1WREF0
				Тор	123	1WREF1
				Тор	18	1WREF2
				Тор	79	1WREF3
				Bottom	150	1WREF4
				Bottom	123	1WREF5
				Bottom	18	1WREF6
				Bottom	79	1WREF7
	ch0		+	Тор	133	CH 00
			_	Тор	142	CH 16
	ch1		+	Тор	89	CH 01
		-	_	Тор	98	CH 17
	ch2		+	Тор	134	CH 02

	-	Тор	143	CH 18
ch3	+	Тор	90	CH 03
	_	Тор	99	CH 19
ch4	+	Тор	135	CH 04
	_	Тор	144	CH 20
ch5	+	Тор	91	CH 05
	_	Тор	100	CH 21
ch6	+	Тор	136	CH 06
	_	Тор	145	CH 22
ch7	+	Тор	92	CH 07
	_	Тор	101	CH 23
ch8	+	Тор	137	CH 08
	_	Тор	146	CH 24
ch9	+	Тор	93	CH 09
	_	Тор	102	CH 25
ch10	+	Тор	138	CH 10
	_	Тор	147	CH 26
ch11	+	Тор	94	CH 11
	_	Тор	103	CH 27
ch12	+	Тор	139	CH 12
	_	Тор	148	CH 28
ch13	+	Тор	95	CH 13
	_	Тор	104	CH 29
ch14	+	Тор	140	CH 14
	_	Тор	149	CH 30
ch15	+	Тор	96	CH 15
	_	Тор	105	CH 31
ch16	+	Тор	106	CH 32
	_	Тор	115	CH 48
ch17	+	Тор	151	CH 33

	_	Тор	160	CH 49
ch18	+	Тор	107	CH 34
	_	Тор	116	CH 50
ch19	+	Тор	152	CH 35
	_	Тор	161	CH 51
ch20	+	Тор	108	CH 36
	_	Тор	117	CH 52
ch21	+	Тор	153	CH 37
	_	Тор	162	CH 53
ch22	+	Тор	109	CH 38
	_	Тор	118	CH 54
ch23	+	Тор	154	CH 39
	_	Тор	163	CH 55
ch24	+	Тор	110	CH 40
	_	Тор	119	CH 56
ch25	+	Тор	155	CH 41
	_	Тор	164	CH 57
ch26	+	Тор	111	CH 42
	_	Тор	120	CH 58
ch27	+	Тор	156	CH 43
	_	Тор	165	CH 59
ch28	+	Тор	112	CH 44
	_	Тор	121	CH 60
ch29	+	Тор	157	CH 45
	_	Тор	166	CH 61
ch30	+	Тор	113	CH 46
	_	Тор	122	CH 62
ch31	+	Тор	158	CH 47
	_	Тор	167	CH 63

ch32	+	Тор	1	CH 64
	_	Тор	10	CH 80
ch33	+	Тор	45	CH 65
	_	Тор	54	CH 81
ch34	+	Тор	2	CH 66
	_	Тор	11	CH 82
ch35	+	Тор	46	CH 67
	_	Тор	55	CH 83
ch36	+	Тор	3	CH 68
	_	Тор	12	CH 84
ch37	+	Тор	47	CH 69
	_	Тор	56	CH 85
ch38	+	Тор	4	CH 70
	_	Тор	13	CH 86
ch39	+	Тор	48	CH 71
	_	Тор	57	CH 87
ch40	+	Тор	5	CH 72
	_	Тор	14	CH 88
ch41	+	Тор	49	CH 73
	_	Тор	58	CH 89
ch42	+	Тор	6	CH 74
	_	Тор	15	CH 90
ch43	+	Тор	50	CH 75
	_	Тор	59	CH 91
ch44	+	Тор	7	CH 76
	_	Тор	16	CH 92
ch45	+	Тор	51	CH 77
	_	Тор	60	CH 93
ch46	+	Тор	8	CH 78
	-	Тор	17	CH 94

ch47	+	Тор	52	CH 79
	_	Тор	61	CH 95
ch48	+	Тор	62	CH 96
	_	Тор	71	CH 112
ch49	+	Тор	19	CH 97
	_	Тор	28	CH 113
ch50	+	Тор	63	CH 98
	_	Тор	72	CH 114
ch51	+	Тор	20	CH 99
	_	Тор	29	CH 115
ch52	+	Тор	64	CH 100
	_	Тор	73	CH 116
ch53	+	Тор	21	CH 101
	_	Тор	30	CH 117
ch54	+	Тор	65	CH 102
	_	Тор	74	CH 118
ch55	+	Тор	22	CH 103
	_	Тор	31	CH 119
ch56	+	Тор	66	CH 104
	_	Тор	75	CH 120
ch57	+	Тор	23	CH 105
	_	Тор	32	CH 121
ch58	+	Тор	67	CH 106
	_	Тор	76	CH 122
ch59	+	Тор	24	CH 107
	_	Тор	33	CH 123
ch60	+	Тор	68	CH 108
	_	Тор	77	CH 124
ch61	+	Тор	25	CH 109

		Тор	34	CH 125
ch62	+	Тор	69	CH 110
		Тор	78	CH 126
ch63	+	Тор	26	CH 111
	_	Тор	35	CH 127
ch64	+	Bottom	133	CH 128
	_	Bottom	142	CH 144
ch65	+	Bottom	89	CH 129
	_	Bottom	98	CH 145
ch66	+	Bottom	134	CH 130
	_	Bottom	143	CH 146
ch67	+	Bottom	90	CH 131
	_	Bottom	99	CH 147
ch68	+	Bottom	135	CH 132
	_	Bottom	144	CH 148
ch69	+	Bottom	91	CH 133
	_	Bottom	100	CH 149
ch70	+	Bottom	136	CH 134
	_	Bottom	145	CH 150
ch71	+	Bottom	92	CH 135
	_	Bottom	101	CH 151
ch72	+	Bottom	137	CH 136
	_	Bottom	146	CH 152
ch73	+	Bottom	93	CH 137
	_	Bottom	102	CH 153
ch74	+	Bottom	138	CH 138
	_	Bottom	147	CH 154
ch75	+	Bottom	94	CH 139
	_	Bottom	103	CH 155
ch76	+	Bottom	139	CH 140

		Bottom	148	CH 156
ch77	+	Bottom	95	CH 141
	_	Bottom	104	CH 157
ch78	+	Bottom	140	CH 142
	_	Bottom	149	CH 158
ch79	+	Bottom	96	CH 143
	_	Bottom	105	CH 159
ch80	+	Bottom	106	CH 160
	_	Bottom	115	CH 176
ch81	+	Bottom	151	CH 161
	_	Bottom	160	CH 177
ch82	+	Bottom	107	CH 162
	_	Bottom	116	CH 178
ch83	+	Bottom	152	CH 163
	_	Bottom	161	CH 179
ch84	+	Bottom	108	CH 164
	_	Bottom	117	CH 180
ch85	+	Bottom	153	CH 165
	_	Bottom	162	CH 181
ch86	+	Bottom	109	CH 166
	_	Bottom	118	CH 182
ch87	+	Bottom	154	CH 167
	_	Bottom	163	CH 183
ch88	+	Bottom	110	CH 168
	_	Bottom	119	CH 184
ch89	+	Bottom	155	CH 169
	_	Bottom	164	CH 185
ch90	+	Bottom	111	CH 170
	_	Bottom	120	CH 186

ch91	+	Bottom	156	CH 171
	_	Bottom	165	CH 187
ch92	+	Bottom	112	CH 172
	-	Bottom	121	CH 188
ch93	+	Bottom	157	CH 173
	-	Bottom	166	CH 189
ch94	+	Bottom	113	CH 174
	_	Bottom	122	CH 190
ch95	+	Bottom	158	CH 175
	_	Bottom	167	CH 191
ch96	+	Bottom	1	CH 192
	_	Bottom	10	CH 208
ch97	+	Bottom	45	CH 193
	_	Bottom	54	CH 209
ch98	+	Bottom	2	CH 194
	_	Bottom	11	CH 210
ch99	+	Bottom	46	CH 195
	_	Bottom	55	CH 211
ch100	+	Bottom	3	CH 196
	_	Bottom	12	CH 212
ch101	+	Bottom	47	CH 197
	_	Bottom	56	CH 213
ch102	+	Bottom	4	CH 198
	_	Bottom	13	CH 214
ch103	+	Bottom	48	CH 199
	-	Bottom	57	CH 215
ch104	+	Bottom	5	CH 200
	_	Bottom	14	CH 216
ch105	+	Bottom	49	CH 201
	_	Bottom	58	CH 217

ch106	+	Bottom	6	CH 202
	_	Bottom	15	CH 218
ch107	+	Bottom	50	CH 203
	_	Bottom	59	CH 219
ch108	+	Bottom	7	CH 204
	_	Bottom	16	CH 220
ch109	+	Bottom	51	CH 205
	_	Bottom	60	CH 221
ch110	+	Bottom	8	CH 206
	_	Bottom	17	CH 222
ch111	+	Bottom	52	CH 207
	_	Bottom	61	CH 223
ch112	+	Bottom	62	CH 224
	_	Bottom	71	CH 240
ch113	+	Bottom	19	CH 225
	_	Bottom	28	CH 241
ch114	+	Bottom	63	CH 226
	_	Bottom	72	CH 242
ch115	+	Bottom	20	CH 227
	_	Bottom	29	CH 243
ch116	+	Bottom	64	CH 228
	_	Bottom	73	CH 244
ch117	+	Bottom	21	CH 229
	_	Bottom	30	CH 245
ch118	+	Bottom	65	CH 230
	_	Bottom	74	CH 246
ch119	+	Bottom	22	CH 231
	_	Bottom	31	CH 247
ch120	+	Bottom	66	CH 232

	_	Bottom	75	CH 248
ch121	+	Bottom	23	CH 233
	—	Bottom	32	CH 249
ch122	+	Bottom	67	CH 234
	_	Bottom	76	CH 250
ch123	+	Bottom	24	CH 235
	_	Bottom	33	CH 251
ch124	+	Bottom	68	CH 236
	_	Bottom	77	CH 252
ch125	+	Bottom	25	CH 237
	_	Bottom	34	CH 253
ch126	+	Bottom	69	CH 238
	_	Bottom	78	CH 254
ch127	+	Bottom	26	CH 239
	_	Bottom	35	CH 255

NI SCXI-1130 4-Wire Multiplexer Topologies

The following figure and table identify the pins for the NI SCXI-1130 in the 4-wire multiplexer topologies.

		_	_	_			
133 -		f	î	ŕ	o		1
134 -	89 -	-	j	Ľ	0	- 45	2
135 -	90 -	-	j	ŕ	0-	- 46	3
136 -	91 -	-	j	Ľ	0	- 47	4
137 -	92 -	.	ſ	Ľ	0	- 48	5
138 -	93 -	-	ľ	Ľ	0-	- 49	6
139 -	94 -	-	j	Ľ	0-	- 50	7
140 -	95 -	-	ľ	Ľ	0	- 51	8
141 -	96 -	-	ſ	Ľ	0	- 52	9
142 -	97 -		ſ	Ľ	0-	- 53	10
143 -	98 -	•			0-	- 54	11
144 -	99 -	-	Ĵ	Ĺ	0-	- 55	12
145 -	100 -		Ĵ	Ĺ	- -	- 56	13
146 -	101 -	Ŀ	Ĵ	Ĺ	0	- 57	14
147	102 -	-	Ĵ	Ĺ	_	- 58	15
	103 -	•	Ĵ	Ĺ	0-	- 59	
148 -	104 -	•	Ĵ	Ĺ	0-	- 60	16
149	105 -	°	Ĵ	Ľ	0-	- 61	17
150 -	106 -	<u>°</u>	Ĵ	Ĺ	0	- 62	18
151 -	107 -	<u>°</u>	Ĵ	Ĺ	0-	- 63	19
152 -	108 -	°	ĵ	Ĺ	0	- 64	20
153 -	109 -	<u>•</u>	ĵ	Ĺ	0	- 65	21
154 -	110 -	<u>•</u>	Ĵ	Ľ	0-	- 66	22
155 -	111 -	-•	ĵ	ľ	ъ-		23
156 -		-•	ĵ	Ĺ	0-	- 67	24
157 -	112 -	-0	ĵ	Ľ	0	- 68	25
158 -	113 -		ĵ	Ľ	0-	- 69	26
159 -	114 -	-0	ĵ	Ľ	0	- 70	27
160 ·	115 -		ĵ	Ľ	0-	- 71	28
161 -	116 -		j	ŕ	0	- 72	29
162 -	117 -	-	ſ	Ľ	0-	- 73	30
163 -	118 -	.	ſ	Ľ	0	- 74	31
164 -	119 -	•	ľ	Ľ	0	- 75	32
165 -	120 -	-			0	- 76	- 33
166 -	121 -	-	Ĵ	Ĺ	0-	- 77	34
167 -	122 -	6	Ĵ	Ĺ	0	- 78	35
	123 -	+	Ĵ	Ĺ	_	- 79	
168 -	124 -	•	Ĵ	Ĺ	0-	- 80	36
169 -	125 -	•	Ĵ	Ĺ	0-	- 81	37
170	126 -	°	Ĵ	Ĺ	0-	- 82	38
171 -	127 -	<u>۹</u>	Ĵ	Ĺ	0	- 83	- 39
172 -	128 -	•	Ĵ	Ĺ	0	- 84	40
173 -	129 -	•	ĵ	Ĺ	•	- 85	41
174 ·	130 -	•	Ĵ	Ľ	0	- 86	42
175 -	131 -	•	ĵ	Ĺ	0		43
176 -		•	ĵ	Ľ	0	- 87	44
	132 -					- 88	

Softwar	e Name		ł	Hardware	Name
Single	Quad	Polarity	Connector	Pin	NI SCXI-1377

64x1	16x1		Location	Number	Terminal Name
com0	com0	A+	Тор	141	OUT 0
Como		A-	Тор	97	OUT 1
		B+	Тор	9	OUT 4
		B-	Тор	53	OUT 5
	com1	A+	Тор	114	OUT 2
		A-	Тор	159	OUT 3
		B+	Тор	70	OUT 6
		B-	Тор	27	OUT 7
	com2	A+	Bottom	141	OUT 8
		A-	Bottom	97	OUT 9
		B+	Bottom	9	OUT 12
		B-	Bottom	53	OUT 13
	com3	A+	Bottom	114	OUT 10
		A-	Bottom	159	OUT 11
		B+	Bottom	70	OUT 14
		B-	Bottom	27	OUT 15
			Тор	150	1WREF0
			Тор	123	1WREF1
			Тор	18	1WREF2
			Тор	79	1WREF3
			Bottom	150	1WREF4
			Bottom	123	1WREF5
			Bottom	18	1WREF6
			Bottom	79	1WREF7
ch	10	A+	Тор	133	CH 00
		A-	Тор	142	CH 16
		B+	Тор	1	CH 64
		B-	Тор	10	CH 80
ch	1	A+	Тор	89	CH 01

	A-	Тор	96	CH 17
	B+	Тор	45	CH 65
	B-	Тор	54	CH 81
ch2	A+	Тор	134	CH 02
	A-	Тор	143	CH 18
	B+	Тор	2	CH 66
	B-	Тор	11	CH 82
ch3	A+	Тор	90	CH 03
	A-	Тор	99	CH 19
	B+	Тор	46	CH 67
	B-	Тор	55	CH 83
ch4	A+	Тор	135	CH 04
	A-	Тор	144	CH 20
	B+	Тор	3	CH 68
	B-	Тор	12	CH 84
ch5	A+	Тор	91	CH 05
	A-	Тор	100	CH 21
	B+	Тор	47	CH 69
	B-	Тор	56	CH 85
ch6	A+	Тор	136	CH 06
	A-	Тор	145	CH 22
	B+	Тор	4	CH 70
	B-	Тор	13	CH 86
ch7	A+	Тор	92	CH 07
	A-	Тор	101	CH 23
	B+	Тор	48	CH 71
	B-	Тор	57	CH 87
ch8	A+	Тор	137	CH 08
	A-	Тор	146	CH 24
	B+	Тор	5	CH 72

	B-	Тор	14	CH 88
ch9	A+	Тор	93	CH 09
	A-	Тор	102	CH 25
	B+	Тор	49	CH 73
	B-	Тор	58	CH 89
ch10	A+	Тор	138	CH 10
	A-	Тор	147	CH 26
	B+	Тор	6	CH 74
	B-	Тор	15	CH 90
ch11	A+	Тор	94	CH 11
	A-	Тор	103	CH 27
	B+	Тор	50	CH 75
	B-	Тор	59	CH 91
ch12	A+	Тор	139	CH 12
	A-	Тор	148	CH 28
	B+	Тор	7	CH 76
	B-	Тор	16	CH 92
ch13	A+	Тор	95	CH 13
	A-	Тор	104	CH 29
	B+	Тор	51	CH 77
	B-	Тор	60	CH 93
ch14	A+	Тор	140	CH 14
	A-	Тор	149	CH 30
	B+	Тор	8	CH 78
	B-	Тор	17	CH 94
ch15	A+	Тор	96	CH 15
	A-	Тор	105	CH 31
	B+	Тор	52	CH 79
	B-	Тор	61	CH 95

ch16	A+	Тор	106	CH 32
	A-	Тор	115	CH 48
	B+	Тор	62	CH 96
	B-	Тор	71	CH 112
ch17	A+	Тор	151	CH 33
	A-	Тор	160	CH 49
	B+	Тор	19	CH 97
	B-	Тор	28	CH 113
ch18	A+	Тор	107	CH 34
	A-	Тор	116	CH 50
	B+	Тор	63	CH 98
	B-	Тор	72	CH 114
ch19	A+	Тор	152	CH 35
	A-	Тор	161	CH 51
	B+	Тор	20	CH 99
	B-	Тор	29	CH 115
ch20	A+	Тор	108	CH 36
	A-	Тор	117	CH 52
	B+	Тор	64	CH 100
	B-	Тор	73	CH 116
ch21	A+	Тор	153	CH 37
	A-	Тор	162	CH 53
	B+	Тор	21	CH 101
	B-	Тор	30	CH 117
ch22	A+	Тор	109	CH 38
	A-	Тор	118	CH 54
	B+	Тор	65	CH 102
	B-	Тор	74	CH 118
ch23	A+	Тор	154	CH 39
	A-	Тор	163	CH 55

	B+	Тор	22	CH 103
	B-	Тор	31	CH 119
ch24	A+	Тор	110	CH 40
	A-	Тор	119	CH 56
	B+	Тор	66	CH 104
	B-	Тор	75	CH 120
ch25	A+	Тор	155	CH 41
	A-	Тор	164	CH 57
	B+	Тор	23	CH 105
	B-	Тор	32	CH 121
ch26	A+	Тор	111	CH 42
	A-	Тор	120	CH 58
	B+	Тор	67	CH 106
	B-	Тор	76	CH 122
ch27	A+	Тор	156	CH 43
	A-	Тор	165	CH 59
	B+	Тор	24	CH 107
	B-	Тор	33	CH 123
ch28	A+	Тор	112	CH 44
	A-	Тор	121	CH 60
	B+	Тор	68	CH 108
	B-	Тор	77	CH 124
ch29	A+	Тор	157	CH 45
	A-	Тор	166	CH 61
	B+	Тор	25	CH 109
	B-	Тор	34	CH 125
ch30	A+	Тор	113	CH 46
	A-	Тор	122	CH 62
	B+	Тор	69	CH 110

	B-	Тор	78	CH 126
ch31	A+	Тор	158	CH 47
	A-	Тор	167	CH 63
	B+	Тор	26	CH 111
	B-	Тор	35	CH 127
ch32	A+	Bottom	133	CH 128
	A-	Bottom	142	CH 144
	B+	Bottom	1	CH 192
	B-	Bottom	10	CH 208
ch33	A+	Bottom	89	CH 129
	A-	Bottom	96	CH 145
	B+	Bottom	45	CH 193
	B-	Bottom	54	CH 209
ch34	A+	Bottom	134	CH 130
	A-	Bottom	143	CH 146
	B+	Bottom	2	CH 194
	B-	Bottom	11	CH 210
ch35	A+	Bottom	90	CH 131
	A-	Bottom	99	CH 147
	B+	Bottom	46	CH 195
	B-	Bottom	55	CH 211
ch36	A+	Bottom	135	CH 132
	A-	Bottom	144	CH 148
	B+	Bottom	3	CH 196
	B-	Bottom	12	CH 212
ch37	A+	Bottom	91	CH 133
	A-	Bottom	100	CH 149
	B+	Bottom	47	CH 197
	B-	Bottom	56	CH 213
ch38	A+	Bottom	136	CH 134

	A-	Bottom	145	CH 150
	B+	Bottom	4	CH 198
	B-	Bottom	13	CH 214
ch39	A+	Bottom	92	CH 135
	A-	Bottom	101	CH 151
	B+	Bottom	48	CH 199
	B-	Bottom	57	CH 215
ch40	A+	Bottom	137	CH 136
	A-	Bottom	146	CH 152
	B+	Bottom	5	CH 200
	B-	Bottom	14	CH 216
ch41	A+	Bottom	93	CH 137
	A-	Bottom	102	CH 153
	B+	Bottom	49	CH 201
	B-	Bottom	58	CH 217
ch42	A+	Bottom	138	CH 138
	A-	Bottom	147	CH 154
	B+	Bottom	6	CH 202
	B-	Bottom	15	CH 218
ch43	A+	Bottom	94	CH 139
	A-	Bottom	103	CH 155
	B+	Bottom	50	CH 203
	B-	Bottom	59	CH 219
ch44	A+	Bottom	139	CH 140
	A-	Bottom	148	CH 156
	B+	Bottom	7	CH 204
	B-	Bottom	16	CH 220
ch45	A+	Bottom	95	CH 141
	A-	Bottom	104	CH 157

	B+	Bottom	51	CH 205
	B-	Bottom	60	CH 221
ch46	A+	Bottom	140	CH 142
	A-	Bottom	149	CH 158
	B+	Bottom	8	CH 206
	B-	Bottom	17	CH 222
ch47	A+	Bottom	96	CH 143
	A-	Bottom	105	CH 159
	B+	Bottom	52	CH 207
	B-	Bottom	61	CH 223
ch48	A+	Bottom	106	CH 160
	A-	Bottom	115	CH 176
	B+	Bottom	62	CH 224
	B-	Bottom	71	CH 240
ch49	A+	Bottom	151	CH 161
	A-	Bottom	160	CH 177
	B+	Bottom	19	CH 225
	B-	Bottom	28	CH 241
ch50	A+	Bottom	107	CH 162
	A-	Bottom	116	CH 178
	B+	Bottom	63	CH 226
	B-	Bottom	72	CH 242
ch51	A+	Bottom	152	CH 163
	A-	Bottom	161	CH 179
	B+	Bottom	20	CH 227
	B-	Bottom	29	CH 243
ch52	A+	Bottom	108	CH 164
	A-	Bottom	117	CH 180
	B+	Bottom	64	CH 228
	B-	Bottom	73	CH 244

		Bottom	153	CH 165
	A-	Bottom	162	CH 181
	B+	Bottom	21	CH 229
	B-	Bottom	30	CH 245
ch54	A+	Bottom	109	CH 166
	A-	Bottom	118	CH 182
	B+	Bottom	65	CH 230
	B-	Bottom	74	CH 246
ch55	A+	Bottom	154	CH 167
	A-	Bottom	163	CH 183
	B+	Bottom	22	CH 231
	B-	Bottom	31	CH 247
ch56	A+	Bottom	110	CH 168
	A-	Bottom	119	CH 184
	B+	Bottom	66	CH 232
	B-	Bottom	75	CH 248
ch57	A+	Bottom	155	CH 169
	A-	Bottom	164	CH 185
	B+	Bottom	23	CH 233
	B-	Bottom	32	CH 249
ch58	A+	Bottom	111	CH 170
	A-	Bottom	120	CH 186
	B+	Bottom	67	CH 234
	B-	Bottom	76	CH 250
ch59	A+	Bottom	156	CH 171
	A-	Bottom	165	CH 187
	B+	Bottom	24	CH 235
	B-	Bottom	33	CH 251
ch60	A+	Bottom	112	CH 172

	A-	Bottom	121	CH 188
	B+	Bottom	68	CH 236
	B-	Bottom	77	CH 252
ch61	A+	Bottom	157	CH 173
	A-	Bottom	166	CH 189
	B+	Bottom	25	CH 237
	B-	Bottom	34	CH 253
ch62	A+	Bottom	113	CH 174
	A-	Bottom	122	CH 190
	B+	Bottom	69	CH 238
	B-	Bottom	78	CH 254
ch63	A+	Bottom	158	CH 175
	A-	Bottom	167	CH 191
	B+	Bottom	26	CH 239
	B-	Bottom	35	CH 255

NI SCXI-1130 1-Wire 4x64 Matrix Topology

The following figure and table identify the pins for the NI SCXI-1130 in the 1-wire 4x64 matrix topology.

		_	_	\neg		
133 -		f• i	Ŷ	o		1
134 -	89 -		ŕ	0	- 45	2
135 -	90 -	-	Ľ	0-	- 46	3
136	91 -		Ľ	0	- 47	4
137 -	92 -		Ľ	0	- 48	- 5
138	93 -		Ľ	0-	- 49	6
139 -	94 -		Ľ	0-	- 50	7
140 -	95 -		Ľ	0-	- 51	8
141 -	96 -		Ľ	0	- 52	9
142 -	97 -		Ľ	0-	- 53	10
143 -	98 -			0-	- 54	11
144 -	99 -	\vdash	Ĺ	0-	- 55	12
145 -	100 -	-	Ĺ	-	- 56	13
146	101 -	+	Ĺ	0	- 57	- 14
147	102 -	-	Ĺ	-	- 58	15
148 -	103 -	+	Ĺ		- 59	- 16
	104 -		Ĺ	0	- 60	
149	105 -		Ľ	0-	- 61	17
150 -	106 -		Ĺ	0	- 62	- 18
151 -	107 -	2	Ĺ	0-	- 63	• 19
152 -	108 -	2	Ĺ	0-	- 64	20
153 -	109 -	p	Ĺ	0	- 65	- 21
154 -	110 -	p	Ĺ	0-	- 66	- 22
155 -	111 -	2	Ĺ	0	- 67	- 23
156 -	112 -	2	Ľ	0	- 68	- 24
157 -	113 -	2	Ĺ	D-	- 69	- 25
158 -	114 -	<u>•</u>	Ĺ	0-	- 70	- 26
159 -	115 -	<u>•</u>	Ĺ	0-	- 71	- 27
160	116 -	- 1	Ĺ	0-	- 72	- 28
161 -		• •	Ĺ	0-		29
162 -	117 -	- '	Ĺ	0-	- 73	- 30
163 ·	118 -	- 9	Ĺ	0-	- 74	- 31
164 -	119 -	- • •	ŕ	0-	- 75	- 32
165 -	120 -	- 9	Ĺ	0-	- 76	- 33
166 -	121 -	-	Ľ	0-	- 77	34
167 -	122 -	-	Ĺ	0	- 78	- 35
168 -	123 -	-	Ľ	0-	- 79	36
169 -	124 -	•	ŕ	0	- 80	37
170	125 -	-	Ľ	0-	- 81	38
171 -	126 -		ŕ	D	- 82	- 39
172 -	127 -	•••	Ľ	0-	- 83	40
173 -	128 -		Ľ	0	- 84	41
174	129 -	-		0-	- 85	42
175 -	130 -			0	- 86	43
176 -	131 -			0-	- 87	44
	132 -	\vdash	L	-	- 88	
			_			

	На	rdware Name	
Software Name			NI SCXI-1378

	Connector Location	Pin Number(s)	Terminal Name
rO	Top and Bottom	141	ROW 0
r1	Top and Bottom	114	ROW 2
r2	Top and Bottom	9	ROW 4
r3	Top and Bottom	70	ROW 6
c0	Тор	1, 62, 106, 133	COLUMN 0
c1	Тор	45, 19, 151, 89	COLUMN 1
c2	Тор	2, 63, 107, 134	COLUMN 2
с3	Тор	46, 20, 152, 90	COLUMN 3
c4	Тор	3, 64, 108, 1	COLUMN 4
c5	Тор	47, 21, 153, 91	COLUMN 5
c6	Тор	4, 65, 109, 136	COLUMN 6
c7	Тор	48, 22, 154, 92	COLUMN 7
c8	Тор	5, 66, 110, 137	COLUMN 8
c9	Тор	49, 23, 155, 93	COLUMN 9
c10	Тор	6, 67, 111, 138	COLUMN 10
c11	Тор	50, 24, 156, 94	COLUMN 11
c12	Тор	7, 68, 112, 139	COLUMN 12
c13	Тор	51, 25, 157, 95	COLUMN 13
c14	Тор	8, 69, 113, 140	COLUMN 14
c15	Тор	52, 26, 158, 96	COLUMN 15
c16	Тор	10, 71, 115, 142	COLUMN 16
c17	Тор	54, 28, 160, 98	COLUMN 17
c18	Тор	11, 72, 116, 143	COLUMN 18
c19	Тор	55, 29, 161, 99	COLUMN 19
c20	Тор	12, 73, 117, 144	COLUMN 20
c21	Тор	56, 30, 162, 100	COLUMN 21
c22	Тор	13, 74, 118, 145	COLUMN 22
c23	Тор	57, 31, 163, 101	COLUMN 23

c24	Тор	14, 75, 119, 146	COLUMN 24
c25	Тор	58, 32, 164, 102	COLUMN 25
c26	Тор	15, 76, 120, 147	COLUMN 26
c27	Тор	59, 33, 165, 103	COLUMN 27
c28	Тор	16, 77, 121, 148	COLUMN 28
c29	Тор	60, 34, 166, 104	COLUMN 29
c30	Тор	17, 78, 122, 149	COLUMN 30
c31	Тор	61, 35, 167, 105	COLUMN 31
c32	Bottom	1, 62, 106, 133	COLUMN 32
c33	Bottom	45, 19, 151, 89	COLUMN 33
c34	Bottom	2, 63, 107, 134	COLUMN 34
c35	Bottom	46, 20, 152, 90	COLUMN 35
c36	Bottom	3, 64, 108, 1	COLUMN 36
c37	Bottom	47, 21, 153, 91	COLUMN 37
c38	Bottom	4, 65, 109, 136	COLUMN 38
c39	Bottom	48, 22, 154, 92	COLUMN 39
c40	Bottom	5, 66, 110, 137	COLUMN 40
c41	Bottom	49, 23, 155, 93	COLUMN 41
c42	Bottom	6, 67, 111, 138	COLUMN 42
c43	Bottom	50, 24, 156, 94	COLUMN 43
c44	Bottom	7, 68, 112, 139	COLUMN 44
c45	Bottom	51, 25, 157, 95	COLUMN 45
c46	Bottom	8, 69, 113, 140	COLUMN 46
c47	Bottom	52, 26, 158, 96	COLUMN 47
c48	Bottom	10, 71, 115, 142	COLUMN 48
c49	Bottom	54, 28, 160, 98	COLUMN 49
c50	Bottom	11, 72, 116, 143	COLUMN 50
c51	Bottom	55, 29, 161, 99	COLUMN 51
c52	Bottom	12, 73, 117, 144	COLUMN 52

c53	Bottom	56, 30, 162, 100	COLUMN 53
c54	Bottom	13, 74, 118, 145	COLUMN 54
c55	Bottom	57, 31, 163, 101	COLUMN 55
c56	Bottom	14, 75, 119, 146	COLUMN 56
c57	Bottom	58, 32, 164, 102	COLUMN 57
c58	Bottom	15, 76, 120, 147	COLUMN 58
c59	Bottom	59, 33, 165, 103	COLUMN 59
c60	Bottom	16, 77, 121, 148	COLUMN 60
c61	Bottom	60, 34, 166, 104	COLUMN 61
c62	Bottom	17, 78, 122, 149	COLUMN 62
c63	Bottom	61, 35, 167, 105	COLUMN 63

NI SCXI-1130 1-Wire 8x32 Matrix Topology

The following figure and table identify the pins for the NI SCXI-1130 in the 1-wire 8x32 matrix topology.

133 -					
134 -	89 -	0 9 9 0 45 2			
135 -	90 -	0 0 0 0 0 3			
136	91 -	47 4			
137 -	92 -	48 5			
138 -	93 -	49 6			
139 -	94 -	50 7			
140 -	95 -	51 8			
141 -	96 -	52 9			
142 -	97 -	53 10			
143 -	98 -	• • • • 54 • • • • 55			
144 -	99 -	• • • • <u>55</u> 12			
145 -	100 -	• • • • <u>56</u> 13			
146 -	101 -	57 14			
147	102 -	• • • • 58 • • • • 58 15			
148 -	103 -	59			
149	104 -	⊢ 60			
150 -	105 -	→ ↓ 61			
151 -	106 -	62			
152 -	107 -	⊢			
153 -	108 -	64			
154 -	109 -				
155 -	110 -	66			
156 -	111 -	⊢			
157 -	112 -	68			
158 -	113 -	25 69 26			
159 -	114 -				
160	115 -	27 27 27 27 27 27 28			
161 -	116 -				
162 -	117 -				
163 -	118 -	• • • • • 74 31			
164 -	119 -				
165 -	120 -				
166 -	121 -	o 9 0 77 34			
167 -	122 -				
168 -	123 -	79 36			
169 -	124 -	80 37			
170	125 -	81 38			
171 -	126 -				
172 -	127 -	· · · · · · · · · · · · · · · · · · ·			
173 -	128 -	0 0 0 0 04 41			
174	129 -	• P P • 85 42			
175 -	130 -	0 9 9 0 86 43			
176 -	131 -	0 P P 0 87 44			
	132 -	88			
		\sim			
		1			

Software	Hardware Name		
Name	Connector		NI SCXI-1379

	Location	Pin Number(s)	Terminal Name
rO	Top and Bottom	141	ROW 0
r1	Top and Bottom	97	ROW 1
r2	Top and Bottom	114	ROW 2
r3	Top and Bottom	159	ROW 3
r4	Top and Bottom	9	ROW 4
r5	Top and Bottom	53	ROW 5
r6	Top and Bottom	70	ROW 6
r7	Top and Bottom	27	ROW 7
c0	Тор	1, 62, 106, 133, 10, 71, 115, 142	COLUMN 0
c1	Тор	45, 19, 151, 89, 54, 28, 160, 98	COLUMN 1
c2	Тор	2, 63, 107, 134, 11, 72, 116, 143	COLUMN 2
с3	Тор	46, 20, 152, 90, 55, 29, 161, 99	COLUMN 3
c4	Тор	3, 64, 108, 135, 12, 73, 117, 144	COLUMN 4
c5	Тор	47, 21, 153, 91, 56, 30, 162, 100	COLUMN 5
c6	Тор	4, 65, 109, 136, 13, 74, 118, 145	COLUMN 6
с7	Тор	48, 22, 154, 92, 57, 31, 163, 101	COLUMN 7
c8	Тор	5, 66, 110, 137, 14, 75, 119, 146	COLUMN 8
c9	Тор	49, 23, 155, 93, 58, 32, 164, 102	COLUMN 9
c10	Тор	6, 67, 111, 138, 15, 76, 120, 147	COLUMN 10
c11	Тор	50, 24, 156, 94, 59, 33,	COLUMN 11

		165, 103	
c12	Тор	7, 68, 112, 139, 16, 77, 121, 148	COLUMN 12
c13	Тор	51, 25, 157, 95, 60, 34, 166, 104	COLUMN 13
c14	Тор	8, 69, 113, 140, 17, 78, 122, 149	COLUMN 14
c15	Тор	52, 26, 158, 96, 61, 35, 167, 105	COLUMN 15
c16	Bottom	1, 62, 106, 133, 10, 71, 115, 142	COLUMN 16
c17	Bottom	45, 19, 151, 89, 54, 28, 160, 98	COLUMN 17
c18	Bottom	2, 63, 107, 134, 11, 72, 116, 143	COLUMN 18
c19	Bottom	46, 20, 152, 90, 55, 29, 161, 99	COLUMN 19
c20	Bottom	3, 64, 108, 135, 12, 73, 117, 144	COLUMN 20
c21	Bottom	47, 21, 153, 91, 56, 30, 162, 100	COLUMN 21
c22	Bottom	4, 65, 109, 136, 13, 74, 118, 145	COLUMN 22
c23	Bottom	48, 22, 154, 92, 57, 31, 163, 101	COLUMN 23
c24	Bottom	5, 66, 110, 137, 14, 75, 119, 146	COLUMN 24
c25	Bottom	49, 23, 155, 93, 58, 32, 164, 102	COLUMN 25
c26	Bottom	6, 67, 111, 138, 15, 76, 120, 147	COLUMN 26
c27	Bottom	50, 24, 156, 94, 59, 33, 165, 103	COLUMN 27

c28	Bottom	7, 68, 112, 139, 16, 77, 121, 148	COLUMN 28
c29	Bottom	51, 25, 157, 95, 60, 34, 166, 104	COLUMN 29
c30	Bottom	8, 69, 113, 140, 17, 78, 122, 149	COLUMN 30
c31	Bottom	52, 26, 158, 96, 61, 35, 167, 105	COLUMN 31

NI SCXI-1130 2-Wire 4x32 Matrix Topology

The following figure and table identify the pins for the NI SCXI-1130 in the 2-wire 4x32 matrix topology.

133 -			1
134 -	89 -	0 0 0 0 0	2
135 -	90 -		¹⁶ 3
136 -	91 -		7 4
137 -	92 -		18 5
138 -	93 -		19 6
139 -	94 -		7
140 -	95 -	\square \square \notin \mathfrak{s}	51 8
	96 -		52
141 -	97 -		
142 -	98 -		
143 -	99 -		
144 -	100 -		
145 -	101 -		13 57
146 -	102 -	-	
147 ·	103 -	-	
148 -	104 -	-	
149 -		• • • • •	1/
150 -	105 -	0 9 9 0	18
151 -	106 -	• • • • •	3 <u>2</u> 19
152 -	107 -	0 9 9 0	20
153 -	108 -	• • • • •	³⁴ 21
154 -	109 -		35 22
155 -	110 -		6 23
156 -	111 -		24
157 -	112 -		25
158 -	113 -		³⁹ 26
159 -	114 -		20 27
160	115 -		' <u>1</u> 28
161 -	116 -		2 29
	117 -		13
162 -	118 -		
163 -	119 -		
164 -	120 -		
165 -	121 -		
166 -	122 -		
167 -	123 -		- 35 /9
168 -	124 -		
169 -	125 -		37
170 ·		H	38
171 -	126 -		- 39
172 -	127 -		40
173 -	128 -	• • • • • •	<u>34</u> 41
174 ·	129 -	0 9 9 0	42
175 -	130 -	0 9 9 0 0	<u>6</u> 43
176 -	131 -	• • • • • •	37 44
	132 -		38

Software		Hardware Name			
Name	Polarity	Connector	Pin	NI SCXI-1378	

		Location	Number(s)	Terminal Name
rO	+	Top and Bottom	141	ROW 0
	_	Top and Bottom	97	ROW 1
r1	+	Top and Bottom	114	ROW 2
	_	Top and Bottom	159	ROW 3
r2	+	Top and Bottom	9	ROW 4
	_	Top and Bottom	53	ROW 5
r3	+	Top and Bottom	70	ROW 6
	_	Top and Bottom	27	ROW 7
c0	+	Тор	1, 62, 106, 133	COLUMN 0
	_	Тор	45, 19, 151, 89	COLUMN 16
c1	+	Тор	2, 63, 107, 134	COLUMN 1
	-	Тор	46, 20, 152, 90	COLUMN 17
c2	+	Тор	3, 64, 108, 135	COLUMN 2
	-	Тор	47, 21, 153, 91	COLUMN 18
с3	+	Тор	4, 65, 109, 136	COLUMN 3
	-	Тор	48, 22, 154, 92	COLUMN 19
c4	+	Тор	5, 66, 110, 137	COLUMN 4
	-	Тор	49, 23, 155, 93	COLUMN 20
с5	+	Тор	6, 67, 111, 138	COLUMN 5
	-	Тор	50, 24, 156, 94	COLUMN 21

c6	+	Тор	7, 68, 112, 139	COLUMN 6
	-	Тор	51, 25, 157, 95	COLUMN 22
c7	+	Тор	8, 69, 113, 140	COLUMN 7
	-	Тор	52, 26, 158, 96	COLUMN 23
c8	+	Тор	10, 71, 115, 142	COLUMN 8
	-	Тор	54, 28, 160, 98	COLUMN 24
c9	+	Тор	11, 72, 116, 143	COLUMN 9
	-	Тор	55, 29, 161, 99	COLUMN 25
c10	+	Тор	12, 73, 117, 144	COLUMN 10
	-	Тор	56, 30, 162, 100	COLUMN 26
c11	+	Тор	13, 74, 118, 145	COLUMN 11
	-	Тор	57, 31, 163, 101	COLUMN 27
c12	+	Тор	14, 75, 119, 146	COLUMN 12
	-	Тор	58, 32, 164, 102	COLUMN 28
c13	+	Тор	15, 76, 120, 147	COLUMN 13
	-	Тор	59, 33, 165, 103	COLUMN 29
c14	+	Тор	16, 77, 121, 148	COLUMN 14

	-	Тор	60, 34, 166, 104	COLUMN 30
c15	+	Тор	17, 78, 122, 149	COLUMN 15
	-	Тор	61, 35, 167, 105	COLUMN 31
c16	+	Bottom	1, 62, 106, 133	COLUMN 32
	-	Bottom	45, 19, 151, 89	COLUMN 48
c17	+	Bottom	2, 63, 107, 134	COLUMN 33
	-	Bottom	46, 20, 152, 90	COLUMN 49
c18	+	Bottom	3, 64, 108, 135	COLUMN 34
	-	Bottom	47, 21, 153, 91	COLUMN 50
c19	+	Bottom	4, 65, 109, 136	COLUMN 35
	-	Bottom	48, 22, 154, 92	COLUMN 51
c20	+	Bottom	5, 66, 110, 137	COLUMN 36
	-	Bottom	49, 23, 155, 93	COLUMN 52
c21	+	Bottom	6, 67, 111, 138	COLUMN 37
	-	Bottom	50, 24, 156, 94	COLUMN 53
c22	+	Bottom	7, 68, 112, 139	COLUMN 38
	_	Bottom	51, 25, 157,	COLUMN 54

			95	
c23	+	Bottom	8, 69, 113, 140	COLUMN 39
	-	Bottom	52, 26, 158, 96	COLUMN 55
c24	+	Bottom	10, 71, 115, 142	COLUMN 40
	-	Bottom	54, 28, 160, 98	COLUMN 56
c25	+	Bottom	11, 72, 116, 143	COLUMN 41
	-	Bottom	55, 29, 161, 99	COLUMN 57
c26	+	Bottom	12, 73, 117, 144	COLUMN 42
	_	Bottom	56, 30, 162, 100	COLUMN 58
c27	+	Bottom	13, 74, 118, 145	COLUMN 43
	-	Bottom	57, 31, 163, 101	COLUMN 59
c28	+	Bottom	14, 75, 119, 146	COLUMN 44
	-	Bottom	58, 32, 164, 102	COLUMN 60
c29	+	Bottom	15, 76, 120, 147	COLUMN 45
	-	Bottom	59, 33, 165, 103	COLUMN 61
c30	+	Bottom	16, 77, 121, 148	COLUMN 46
	-	Bottom	60, 34, 166, 104	COLUMN 62

c31	+	Bottom	17, 78, 122, 149	COLUMN 47
	_	Bottom	61, 35, 167, 105	COLUMN 63

NI SCXI-1130 Matrix Expansion

Matrices of the NI SCXI-1130 can be expanded in two ways: by expanding rows and expanding columns.

To expand columns, use the matrix expansion cable that connects directly into the terminal block. Each expansion cable routes eight 1-wire rows from one terminal block to the next. To form an 8x64 matrix using NI SCXI-1379 terminal blocks, connect two NI SCXI-1379 terminal blocks using one matrix expansion cable.

To expand rows, use the matrix plugs that connect to the top and bottom of selected terminal blocks. Matrix expansion plugs connect the columns of adjacent matrix switch modules. To form an 8×64 1-wire matrix using NI SCXI-1378 terminal blocks, simply connect one matrix expansion plug on the top or the bottom of two adjacent NI SCXI-1378 terminal blocks.

Terminal Block	Configuration (Row x Column)	Column Expansion Via Row Connection	Row Expansion Via Column Connection
<u>NI SCXI-</u> <u>1378</u>	4×64 1-wire	Yes, with row connection cable. Examples: 4×128, 4×192, 4×256, and so on.	Yes, with column connection plug. Examples: 8×64, 12×64, 16×64, and so on.
	4×32 2-wire	Yes, with row connection cable. Examples: 4×64, 4×96, 4×128, and so on.	Yes, with column connection plug. Examples: 8×32, 12×32, 16×32, and so on.
<u>NI SCXI-</u> <u>1379</u>	8×32 1-wire	Yes, with row connection cable. Examples: 8×64, 8×96, 8×128, and so on.	Yes, with column connection plug. Examples: 16×32, 24×32, 32×32, and so on.

Refer to the terminal block installation guides for additional information on column and row expansion of matrices.

NI SCXI-1130 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI SCXI-1130.

Trigger Input	Software	Hard
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI trigge line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI trigge line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI trigge line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI trigge line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI trigge line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI trigge line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI trigge line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI trigge line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG on NI termin block
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 AUX conne of an SCXI backp adapt
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front panel termin block the sv modu in Slo
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front panel termin block the sv modu Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front panel termin block the sy modu Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front panel termin block the sv

		mc Slo
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Fro par terr blo the mo Slo
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Fro par terr blo the mo Slo
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Frc par terr blo the mo Slc
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Fro par terr blo the mo Slo
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Fro par terr blo the mo Slo

Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Fror pane term bloc the s mod Slot
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Fror pane term bloc the s mod Slot
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Fror pane term bloc the s mod Slot
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin (AUX conr of ar SCX back adap conr to th swite Slot
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin AU> coni of a

		SCXI backp adapt conne to the switch modul Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 AUX I conne of an SCXI backp adapt conne to the switch modul Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 AUX I conne of an SCXI backp adapt conne to the switch modul Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 6 AUX I conne of an SCXI backp

		adapt conne to the switch modu Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 6 AUX I conne of an SCXI backp adapt conne to the switch modu Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 AUX conne of an SCXI backp adapt conne to the switch modu Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 AUX of an SCXI backp adapt conne

		to the switc mode Slot
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 AUX conn of an SCX back adap conn to the switc Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 AUX conn of an SCX back adap conn to the switc modu Slot 2
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 AUX conn of an SCX back adap conn to the swite

		modu Slot 1
Rear	Rear Connector Module 12	Pin 6
Connector	(NISWITCH_VAL_REARCONNECTOR_MODULE12)	AUX I
Module 12		conne
		of an
		SCXI
		backp
		adapt
		conne
		to the
		switch
		modu
		Slot 1

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI SCXI-1130.

Scan Advanced Output	Software	Hard
None	None (NISWITCH_VAL_NONE)	N/A
TTLO	TTL0 (NISWITCH_VAL_TTL0)	SCXI trigge 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI trigge 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI trigge 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI trigge 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI trigge 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI trigge 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI trigge 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI trigge 7
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG on NI

		termir block
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 AUX conne of an backr adapt
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front panel termir block the sv modu Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front panel termir block the sv modu Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front panel termir block the sv modu Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front panel termir block the sv modu Slot 4
Front	Front Connector Module 5	Front

Connector Module 5	(NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	pane term bloc the s mod Slot
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	From pane term bloc the s mod Slot
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	From pane term bloc the s mod Slot
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	From pane term bloc the s mod Slot
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	From pane term bloc the s mod Slot
Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Fror pane term

		bloc the moo Slot
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Fro par terr bloo the moo Slo
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Fro par terr bloo the moo Slo
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin AU of a bac ada con to t swi Slo
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin AU con of a bac ada con to t

		swi mo Slo
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin AU con of a bac ada con to t swi Slo
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin AU con of a bac ada con to t swi Slo
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin AU con of a bac ada con to t swi mod
Rear	Rear Connector Module 6	Pin

Connector Module 6	(NISWITCH_VAL_REARCONNECTOR_MODULE6)	AUX conn of an back adap conn to the switc mode Slot
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin S AUX conn of ar back adap conn to the swite Slot
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin S AUX conn of an back adap conn to the swite mode Slot
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 AUX conr of ar back adap

		conn to th switc mod Slot
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 9 AUX conn of ar back adap conn to the swite Slot
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 9 AUX conn of an back adap conn to the switc mode Slot
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 9 AUX conn of ar back adap conn to the swite Mode

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1130 Relay Replacement

The NI SCXI-1130 uses electromechanical reed relays.

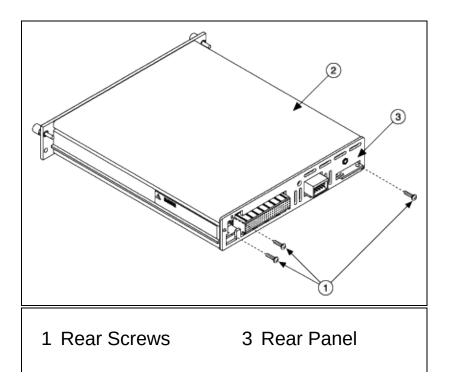
Refer to the following table for information about ordering replacement relays.

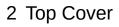
Relay Manufacturer	Part
Meder	MS05-1A71-75DHR

Complete the following sets of steps to disassemble your switch module, replace a failed relay, and reassemble your switch module.

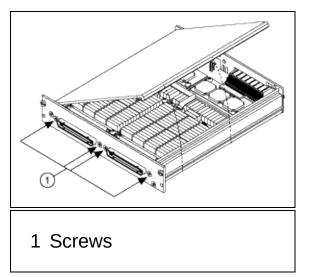
Disassemble the Switch Module

- 1. Ground yourself using a grounding strap or a ground connected to your SCXI chassis.
 - Note Properly grounding yourself prevents damage to your switch module from electrostatic discharge.
- 2. Remove the three rear screws from the back of the switch module.
- 3. Carefully remove the top cover of the switch module using a flathead screwdriver.
- 4. Remove the rear panel.

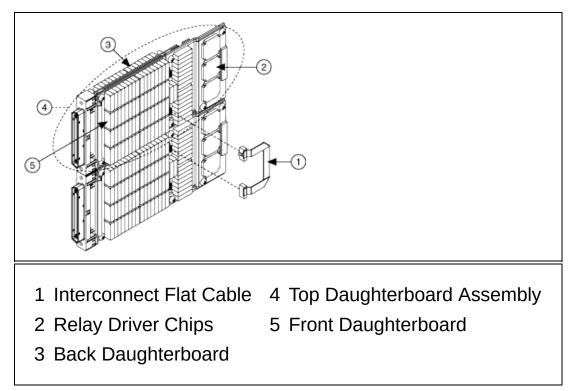




5. Remove the four screws holding the front connectors and the daughterboard assemblies to the front panel.



6. Remove the daughterboard assembly interconnect flat cable.



7. Refer to the following figures to locate the relay you want to

replace.

Note The NI SCXI-1130 has two daughterboard assemblies: a top daughterboard assembly and a bottom daughterboard assembly. The top daughterboard assembly is circled in the figure above. Both top and bottom daughterboard assemblies are comprised of two daughterboards: a front daughterboard and a back daughterboard. The relay driver chips are attached to the front daughterboards.

	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	CHO		
KBC01 KCOM1 KREF01 KBC13	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	CH16	AINICATOD	FHONI CONNECTOR
KBC02 KBC23 KCOM3 KREF23	CH32	CH33	CH34	CH35	CH36	CH37	CH38	CH39	CH40	CH41	CH42	CH43	CH44	CH45	CH46	CH47		FHONI CO
	CH48	CH49	CH50	CH51	CH52	CH53	CH54	CH55	CH56	CH57	CH58	CH59	CH60	CH61	CH62	CH63		

Back Daughterboard, Top Assembly

Front Daughterboard, Top Assembly

																				KBC04
	4	2	9	5	8	6	0	,	,	N .		4	2	9	~	æ	6			SPARE
	CH64	CH65	CH66	CH67	CH68	CH69	CH70	CH71			CH73	CH74	CH75	CH76	CH77	CH78	CH79			SPARE
																				KBC45
										_	_									KCOM5
																				KBC46
~	8	5	N	8	7	35	8	22		p	88	06	16	92	33	94	35			SPARE
TOF	CH80	CH81	CH82	CH83	CH84	CH85	CH86	CH87	ł	CT188	CH89	CH90	CH91	CH92	CH93	CH94	CH95			KREF45
NEC																				
N											_							SPARE	SPARE	
0 F																		2	2	
FRONT CONNECTOR	CH111	CH110	CH109	CH108	CH107	CH106	CH105	CH104		SU IOS	CH102	CH101	CH100	CH99	CH98	CH97	CH96			KBC15
	동	문	윤	£	동	R	동	R	ł	5	핑	ß	ß	ά	ò	ò	ò			KBC57
																				SPARE
										Т										SPARE
		_		_	_						~				_	_				KBC67
	CH127	CH126	CH125	CH124	CH123	CH122	CH121	CH120		RILO	CH118	CH117	CH116	CH115	CH114	CH113	CH112			SPARE
	ċ	Ó	ΰ	ΰ	Ó	ΰ	Ó	ΰ	Ī	5	Ó	ΰ	ΰ	ΰ	ΰ	ΰ	Ó			KREF67
																				KCOM7
1																				

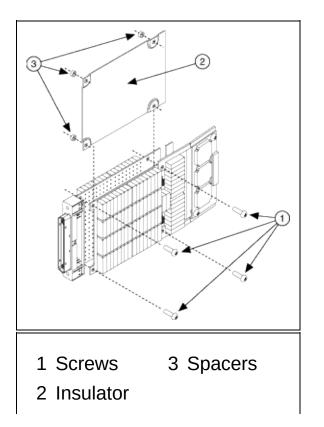
Back Daughterboard, Bottom Assembly

	CH143	CH142	CH141	CH140	CH139	CH138	CH137	CH136	CH135	CH134	CH133	CH132	CH131	CH130	CH129	CH128		
KBC89 KCOM9 KREF89 KBC911	CH159	CH158	CH157	CH156	CH155	CH154	CH153	CH152	CH151	CH150	CH149	CH148	CH147	CH146	CH145	CH144	NNECTOR	
KBC810 KBC1011 KCOM11 KREF1011	CH160	CH161	CH162	CH163	CH164	CH165	CH166	CH167	CH168	CH169	CH170	CH171	CH172	CH173	CH174	CH175	FRONT CONNECTOR	
	CH176	CH177	CH178	CH179	CH180	CH181	CH182	CH183	CH184	CH185	CH186	CH187	CH188	CH189	CH190	CH191		

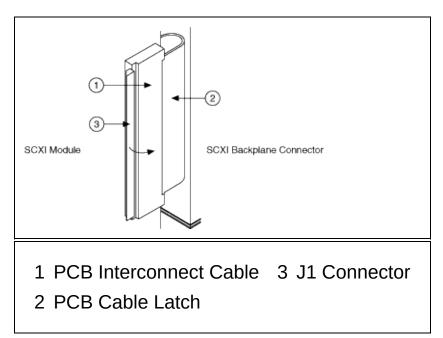
Front Daughterboard, Bottom Assembly

																				KBC812	1
	55	83	8	95	98	97	8	66	8	3	5	52	8	5	35	90	5			KAB8	
	CH192	CH193	CH194	CH195	CH196	CH197	CH198	CH199	1		CH201	CH202	CH203	CH204	CH205	CH206	CH207			KAB12	
	ľ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ			Ŭ	Ŭ		Ŭ	Ŭ	Ŭ				KBC1213	
										_	_									KCOM13	
																				KBC1214	
~	80	60	9	Ξ	12	33	4	15	1		17	18	19	20	21	22	23			KAB13	
1 L	CH208	CH209	CH210	CH211	CH212	CH213	CH214	CH215	0.0010		CH217	CH218	CH219	CH220	CH221	CH222	CH223			KREF1213	
NEO I											-										
N											_							KAB10	KAB11		
Ę																		5	N		
FRONT CONNECTOR	CH239	CH238	CH237	CH236	CH235	CH234	CH233	CH232	100		CH230	CH229	CH228	CH227	CH226	CH225	CH224			KBC913]
1	동	£	£	£	£	£	£	윤	Ī	5	£	£	£	£	£	£	동			KBC1315	1
																				KAB9	
									Γ	Т										KAB14	
		_	_				_	_	.		~		_	_						KBC1415	
	CH255	CH254	CH253	CH252	CH251	CH250	CH249	CH248	1	14700	CH246	CH245	CH244	CH243	CH242	CH241	CH240			KAB15	
	ċ	ΰ	Ó	ΰ	ΰ	Ó	ΰ	Ó	0	5	Ö	ΰ	Ó	ΰ	ΰ	ΰ	Ó			KREF1415	
																				KCOM15	

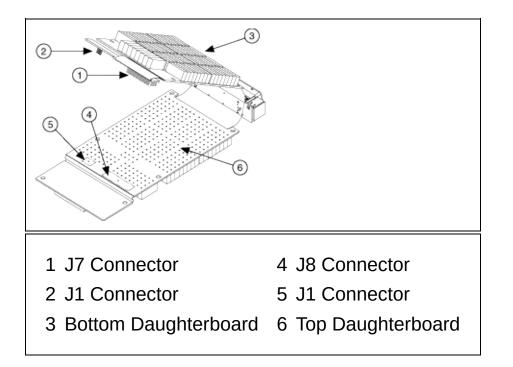
- 8. Remove the four screws that secure the daughterboard assembly to the switch assembly.
- 9. Remove the insulator and spacers that separate the front and back daughterboards.



10. To access the daughterboards, disconnect the PCB interconnect cable by lifting the PCB cable latch on the J1 connector.



11. Carefully disconnect connectors J7 and J1 on the bottom daughterboard from connectors J8 and J1, respectively, on the top daughterboard.



Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Isopropyl alcohol
- Cotton swabs

Replace the relay as you would any other through-hole part.

Reassemble the Switch Module

Complete the <u>Disassemble the Switch Module</u> steps in reverse order to reassemble your switch module.

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI SCXI-1160

The NI SCXI-1160 is a 16-channel general-purpose switch module for the SCXI platform designed for switching and controlling power signals. The NI SCXI-1160 is composed of <u>16-SPDT</u> relays. The NI SCXI-1160 does not support routing signals to the <u>high-voltage analog bus (HVAB</u>).

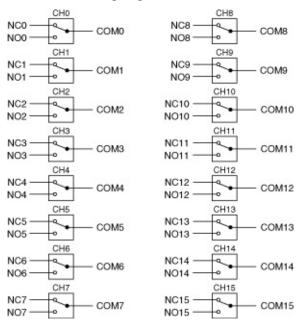
Operation Modes

The following table lists the supported topology of the NI SCXI-1160 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>16-SPDT</u>	1160/16-SPDT	~	
	(NISWITCH_TOPOLOGY_1160_16_SPDT)		

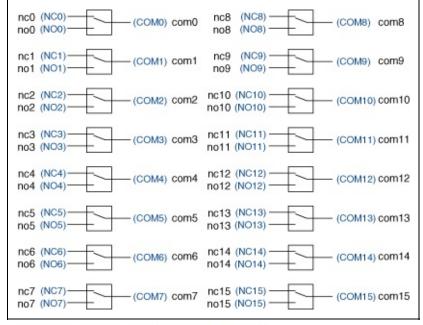
NI SCXI-1160 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1160.



NI SCXI-1160 16-SPDT Topology

The <u>NI SCXI-1324</u> terminal block provides connections to the NI SCXI-1160 in the 16-SPDT <u>general purpose</u> topology. The following figure represents the NI SCXI-1160 in the 16-SPDT topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect the NO terminal of channel 2 to the COM terminal of channel 2, and to disconnect the NC terminal of channel 2 from the COM terminal, call niSwitch_Connect(vi, "NO2", "COM2"). If you now want to connect NC2 to com2, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect(vi, "NO2", "COM2")
```

```
niSwitch_Connect(vi, "NC2", "COM2")
```



Note niSwitch_Disconnect(vi, "NO2", "COM2") does not activate the relay until niSwitch_Connect(vi, "NC2", "COM2") is executed.

Pinout

The following figure identifies the pins for the NI SCXI-1160 in the 16-SPDT topology.

Pin	Signal	C	Colum	n	Signal
Number	Name	A	В	С	Name
32	COM (0)		0		
31	NO (0)	+0		0	- NC (0)
30	COM (1)		0		
29	NO (1)	+0		어	- NC (1)
28	COM (2)		0		
27	NO (2)	+0		0	- NC (2)
26	COM (3)		0		
25	NO (3)	+0		0	- NC (3)
24	COM (4)		0		
23	NO (4)	+0		0	- NC (4)
22	COM (5)		0		
21	NO (5)	+0		어	- NC (5)
20	COM (6)		0		
19	NO (6)	+0		0	- NC (6)
18	COM (7)		0		
17	NO (7)	+0		0	- NC (7)
16	COM (8)		0		
15	NO (8) ·	+0		0	- NC (8)
14	COM (9)		0		
13	NO (9) ·	+0		0	- NC (9)
12	COM (10)		0		
11	NO (10) ·	+0		어	- NC (10)
10	COM (11)		0		
9	NO (11) ·	+0		0	- NC (11)
8	COM (12)		0		
7	NO (12) ·	+0		0	- NC (12)
6	COM (13)		0		
5	NO (13) ·	+0		0	- NC (13)
4	COM (14)		0		
3	NO (14) ·	+0		0	- NC (14)
2	COM (15)		0		
1	NO (15) ·	0		0	- NC (15)

NI SCXI-1160/1161 Contact Protection for Inductive Load Connections

The NI SCXI-1160/1161 modules contain pads on which you can place an arc suppressor protection circuit to limit the voltage spike generated during the <u>switching of inductive loads</u>. These pads are located between the COM position and the NO position and between the COM position and the NC position of the relays.

To determine where to place each arc suppressor, refer to the two tables below, which indicate the channel and suppressor pad assignments.

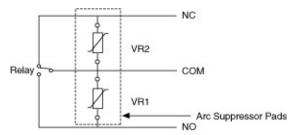
COM to NO Channel Number	Transient Voltage Suppressor Reference Designator
0	VR1
1	VR3
2	VR5
3	VR7
4	VR9
5	VR11
6	VR13
7	VR15
8*	VR17
9*	VR19
10*	VR21
11*	VR23
12*	VR25
13*	VR27
14*	VR29
15*	VR31
* Applies only to NI SCXI-1160.	

COM to NO Arc Suppressor Placement

COM to NC Arc Suppressor Placement

NC to COM Channel Number	Transient Voltage Suppressor Reference Designator
0	VR2
1	VR4
2	VR6
3	VR8
4	VR10
5	VR12
6	VR14
7	VR16
8*	VR18
9*	VR20
10*	VR22
11*	VR24
12*	VR26
13*	VR28
14*	VR30
15*	VR32
* Applies only to NI SCXI-1160.	

The following figure shows how to connect a transient voltage suppressor for AC and DC inductive loads.



NI SCXI-1160/1161 Jumpers

All five jumpers on the NI SCXI-1160/1161 are for digital communication between the controller and the NI SCXI-1160/1161 module. Only one module per chassis is connected to the controller, which allows communication with all other modules. Only the jumper settings on the NI SCXI-1160/1161 module are relevant. If the controller is not cabled to the module, do not change the jumper settings.

The NI SCXI-1160/1161 has two jumpers that are dedicated for communication between the NI SCXI-1160/1161 and the controller. On the NI SCXI-1160, these jumpers are W1 and W5. On the NI SCXI-1161, these jumpers are W1 and W2.

In addition, the NI SCXI-1160/1161 has three jumpers that indicate to the module what type of controller is connected to its rear connector. On the NI SCXI-1160, these jumpers are W2, W3, and W4. On the NI SCXI-1161, these jumpers are W3, W4, and W5. For modules not cabled to a controller, the jumper settings are irrelevant.

 $\overline{\mathbb{N}}$

Note Do *not* change the jumper settings if you intend to control the NI SCXI-1160/1161 with a DIO device.

Jumper Settings

The following sections list possible jumper settings for the NI SCXI-1160/1161.

NI SCXI-1160

Factory settings are in **bold**.

W1	1-2 2-3
	DIO (controller is DIO device) MIO (controller is E Series, NI 4021, or National Instruments DMM)
	DIO (controller is DIO device) MIO (controller is E Series, NI 4021, or National Instruments DMM)
	DIO (controller is DIO device) MIO (controller is E Series, NI 4021, or National Instruments DMM)
W5	1-2 2-3

Set W2, W3 and W4 according to the controller.

- For a single chassis, set W1 and W5 to 1-2.
- For multiple chassis, complete the following steps:
- 1. Set W1 and W5 to 1-2 on all modules connected to the controller.
- 2. Set W1 to 2-3 on all other modules.

NI SCXI-1161

Factory settings are in **bold**.

W1	1-2 2-3
W2	1-2 2-3
W3	DIO (controller is DIO device) MIO (controller is E Series, NI 4021, or National Instruments DMM)
W4	DIO (controller is DIO device) MIO (controller is E Series, NI 4021, or National Instruments DMM)
W5	DIO (controller is DIO device) MIO (controller is E Series, NI 4021, or National Instruments DMM)

Set W3, W4 and W5 according to the controller.

- For a single chassis, set W1 and W2 to 1-2.
- For multiple chassis, complete the following steps:
- 1. Set W1 and W2 to 1-2 on all modules connected to the controller.
- 2. Set W1 to 2-3 on all other modules.

NI SCXI-1161

The NI SCXI-1161 is an 8-channel, <u>general-purpose</u> switch module for the SCXI platform designed for switching power signals with a minimum current of 100 mA. The NI SCXI-1161 is composed of <u>8-SPDT</u> relays. The NI SCXI-1161 does not support routing signals to the <u>high-voltage</u> <u>analog bus</u>.

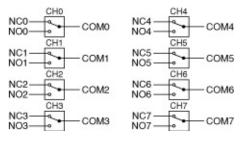
Operation Modes

The following table lists the supported topology of the NI SCXI-1161 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scann
8-SPDT	1161/8-SPDT	~	
	(NISWITCH_TOPOLOGY_1161_8_SPDT)		

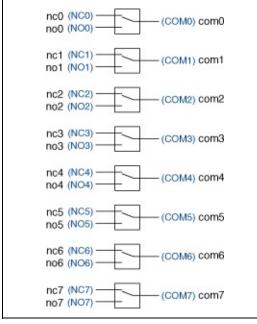
NI SCXI-1161 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1161.



NI SCXI-1161 8-SPDT Topology

The following figure represents the NI SCXI-1161 in the 8-SPDT general purpose topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect the NO terminal of channel 2 to the COM terminal of channel 2, and to disconnect the NC terminal of channel 2 from the COM terminal, call niSwitch_Connect(vi, "NO2", "COM2"). If you now want to connect NC2 to com2, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect(vi, "NO2", "COM2")
```

```
niSwitch_Connect(vi, "NC2", "COM2")
```



Note niSwitch_Disconnect(vi, "NO2", "COM2") does not activate the relay until niSwitch_Connect(vi, "NC2", "COM2") is executed.

NI SCXI-1163R

The NI SCXI-1163R is a 32-channel optically isolated <u>solid-state</u> relay <u>multiplexer</u> module designed for switching and controlling high-voltage signals. The NI SCXI-1163R does not support routing signals to the <u>high-voltage analog bus (HVAB)</u>.

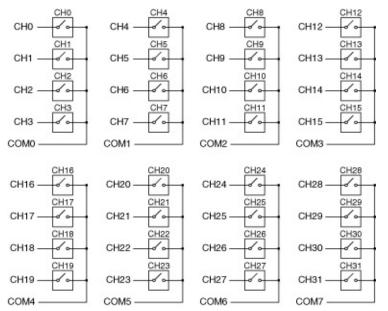
Operation Modes

The following table lists the supported topology of the NI SCXI-1163R and possible operation modes.

Topology	Software Name	Imme
Octal 4x1	1163R/Octal 4x1 Mux	~
Multiplexer	(NISWITCH_TOPOLOGY_1163R_OCTAL_4X1_MUX)	

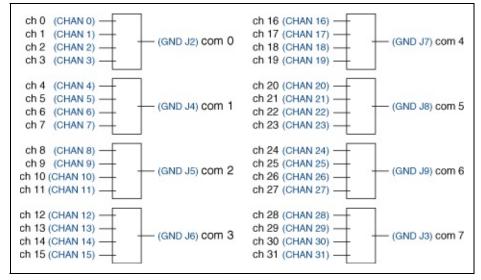
NI SCXI-1163R Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1163r.



NI SCXI-1163R Octal 4×1 Multiplexer Topology

The NI SCXI-1326 terminal block provides connections to the NI SCXI-1163R in the octal 4×1 <u>multiplexer</u> topology. The following figure represents the NI SCXI-1163R as an octal 4×1 multiplexer.



Legend: Software Name (Hardware Name)

Making a Connection

The NI SCXI-1163R contains eight banks of four input channels connected to a common channel. These input channels are referred to as ch<0..31> and eight common channels are referred to as com<0..7>. Because the NI SCXI-1163R is comprised of eight banks of four relays each, you can only connect channels to the common channel in the same bank. The banks are organized as follows:

Input Channels	Common Channel
ch0, ch1, ch2, ch3	com0
ch4, ch5, ch6, ch7	com1
ch8, ch9, ch10, ch11	com2
ch12, ch13, ch14, ch15	com3
ch16, ch17, ch18, ch19	com4
ch20, ch21, ch22, ch23	com5
ch24, ch25, ch26, ch27	com6
ch28, ch29, ch30, ch31	com7

For example, you can connect ch8 to com2; however, you cannot connect ch8 to com6.

You can control the channels of the NI SCXI-1163R using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 4, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com4.

Pinout

The following figure identifies the pins for the NI SCXI-1163R as an octal 4×1 multiplexer.



Note Pins labeled GND are the common terminals in each 8×1 multiplexer. These pins are not connected to ground.

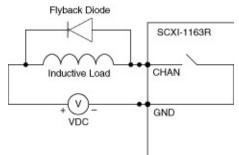
Pin Number	Signal Name	A	olum B	n C	Signal Name
	CHAN(0)		7		
30	CHAN(1)		0	0	- NC
29	CHAN(2)		7	0	- GND
29	CHAN(3)	ΤĽ	0	M	- GND
	CHAN(4)		_		
26	CHAN(5)	+0	6	0	- NC
	CHAN(6)	+			
25	CHAN(7)	10	9	0	- GND
	CHAN(8)		_		
22	CHAN(9)	+0	6	0	- NC
	CHAN(10)		_		
21	CHAN(11)		9	0	- GND
1.0	CHAN(12)		7		110
18	CHAN(13)	to .	0	0	- NC
17	CHAN(14) · CHAN(15) ·		7		- GND
	CHAN(15)	Γ	0	M	- GND
	CHAN(19)	+	_		
14	CHAN(18)	+0	6	0	– GND
	CHAN(17) -				
13	CHAN(16)	+0	9	0	- NC
	CHAN(23)	-	_		
10	CHAN(22) ·		6	0	- GND
	CHAN(21) -	+			
9	CHAN(20)	0	9	0	- NC
	CHAN(27) -				
6	CHAN(27)		7	~	- GND
	CHAN(25)			1	and
5	CHAN(24)		6	0	- NC
	CHAN(31)				
2	CHAN(30) - CHAN(29) -	10	9	0	– GND
			7		NO
1	CHAN(28)	10	0	0	- NC

NI SCXI-1163R Contact Protection for Inductive Load Connections

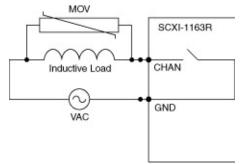
When inductive loads are connected to the <u>solid-state</u> relays, a large counter-electromotive force can occur at relay switching time because of the energy stored in the inductive load. These flyback voltages can severely damage the relays.

It is best to limit these flyback voltages at your inductive load by installing, across your inductive load, a flyback diode for DC loads or a metal oxide varistor (MOV) for AC loads. Refer to the following figures for these two configurations:

Contact Protection for DC Inductive Loads



Contact Protection for AC Inductive Loads



NI SCXI-1163R Jumpers

You can configure the NI SCXI-1163R to operate in serial or parallel mode. You can cable and control the NI SCXI-1163 with an E Series, NI 4021, NI DMM, or DIO device. There are five user-configurable jumpers. If the controller is not cabled to the module, do not change the jumper settings.

In serial mode, only one module per chassis is connected to the controller, which allows communication with all other modules. Only the jumper settings on the NI SCXI-1163R module are relevant.

In parallel mode, a DIO device can only be connected to one NI SCXI-1163R. Signals at the rear signal connector directly control the states of the <u>solid-state</u> relays. A logic low (or 0) on the rear connector closes the corresponding relay. Likewise, a logic high (or 1) opens the relay. In parallel mode, the controller cannot communicate with the SCXI chassis or with other SCXI modules. Therefore, if multiple NI SCXI-1163R modules in an SCXI system are to be used in parallel mode, the rear signal of each module must be connected to separate DIO devices.

Jumper Settings

Factory settings are in **Bold**.

W2	D (controller is DIO device) M (controller is E Series device, NI 4021, National Instruments DMM)
W3	D (controller is DIO device) M (controller is E Series device, NI 4021, National Instruments DMM)
W4	A (single chassis) B (multiple chassis)
W5	DIO (serial mode with DIO controller) M (controller is E Series device, NI 4021, National Instruments DMM) PAR (parallel mode with DIO controller)
W6	S (set primary mode of operation to serial) P (set primary mode of operation to parallel)
Cor	valete the following stone to correctly act the jumpers

Complete the following steps to correctly set the jumpers.

For a single chassis in serial mode:

- 1. Set W2, W3, and W5 according to the controller.
- 2. Set W4 to A.
- 3. Set W6 to S.

For multiple chassis:

- 1. W2, W3, and W5 should be set according to the controller.
- 2. W4 on one cabled module should be set to A, and W4 on all other cabled modules should be set to B.
- 3. W6 should be set to S.

For parallel mode:

- 1. Set W2 and W3 to D.
- 2. Set W4 to A.
- 3. Set W5 to PAR.
- 4. Set W6 to P.

NI SCXI-1166

The NI SCXI-1166 is a 32-channel, general-purpose switch module for the SCXI platform designed for switching and controlling power signals. The NI SCXI-1166 is composed of <u>32-SPDT</u> relays. The NI SCXI-1166 does not support routing signals to the <u>high-voltage analog bus</u>.

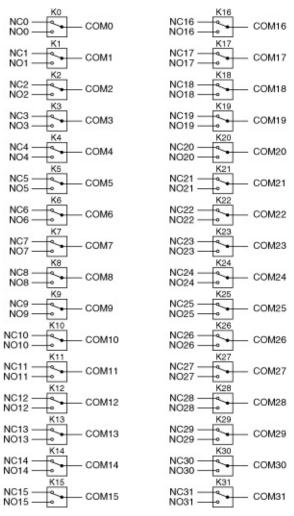
Operation Modes

The following table lists the supported topology of the NI SCXI-1166 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scan
<u>32-SPDT</u>	1166/32-SPDT	~	~
	(NISWITCH_TOPOLOGY_1166_32_SPDT)		

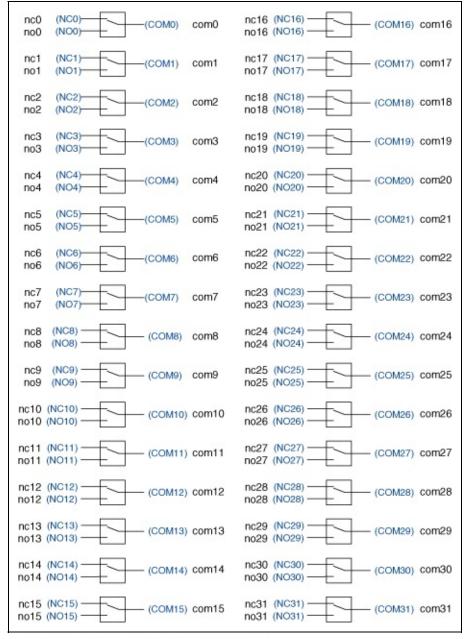
NI SCXI-1166 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1166.



NI SCXI-1166 32-SPDT Topology

The <u>NI SCXI-1366</u> terminal block provides connections to the NI SCXI-1166 in the 32-SPDT <u>general-purpose</u> topology. The following figure represents the NI SCXI-1166 in the 32-SPDT topology.





Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

To connect the NO terminal to the COM terminal of that channel, disconnect the NC terminal from the COM of that channel.

For example, to connect NO2 to COM2, use the following code:

```
niSwitch_Disconnect(vi, "nc2", "com2")
```

```
niSwitch_Connect(vi, "no2", "com2")
```



Note To connect NO to COM you do not need to disconnect NC from COM after the module has been reset or a call to the <u>niSwitch</u> <u>Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function has been made.



Note niSwitch_Disconnect(vi, "nc2", "com2") does not activate the relay until niSwitch_Connect(vi, "no2", "com2") is executed.

To connect the NC terminal to the COM terminal of that channel, disconnect the NO terminal from the COM of that channel.

For example, to connect NC2 to COM2, use the following code:

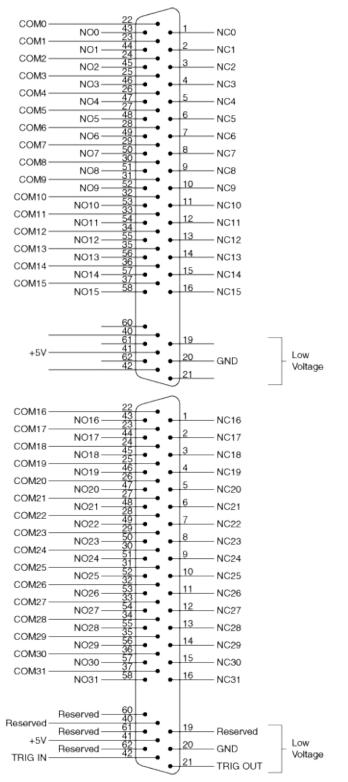
niSwitch_Disconnect(vi, "no2", "com2")

```
niSwitch_Connect(vi, "nc2", "com2")
```

When <u>scanning</u> the NI SCXI-1166, a typical <u>scan list</u> entry could be nc2->com2;. This entry routes the signal connected to NC2 to COM2.

Pinout

The following figures identify the pins for the NI SCXI-1166 in the 32-SPDT topology.



NI SCXI-1166 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI SCXI-1166.

Trigger Input	Software	На
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG SCXI- termir
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 adapt SCXI- 1357/
Front	Front Connector Module 1	Front

Connector Module 1	(NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	termir of the Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front termir of the Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front termir of the Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front termir of the Slot 4
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Front termir of the Slot 5
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Front termir of the Slot 6
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Front termir of the Slot 7
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Front termir of the Slot 8
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Front termir of the Slot 9
Front	Front Connector Module 10	Front

Connector Module 10	(NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	termi of the Slot 1
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Front termi of the Slot 2
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front termi of the Slot 1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 adap SCXI 1357 conne the m Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 6 adap SCXI 1357 conne the m Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 adap SCXI 1357 conne the m Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 adap SCXI 1357 conn

		the Slo
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin ada SC 135 cor the Slo
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin ada SC 135 cor the Slo
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin ada SC 135 cor the Slo
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin ada SC 135 cor the Slo
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin ada SC 135 cor the Slo

Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 6 adapt SCXI- 1357/ conne the m Slot 1

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI SCXI-1166.

Scan Advanced Output	Software	На
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI line 7
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG NI SC termir
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 adapt SCXI- 1357/
Front Connector	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front termir

Module 1		of th Slot
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Fron term of th Slot
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Fron term of th Slot
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Fron term of th Slot
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Fron term of th Slot
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Fron term of th Slot
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Fron term of th Slot
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Fron term of th Slot
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Fron term of th Slot
Front Connector	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Fron term

Module 10		of the Slot 1
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Front
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front termi of the Slot 2
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 9 adap SCXI 1357 conn the m Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 9 adap SCXI 1357 conne the m Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 9 adap SCXI 1357 conn the m Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 9 adap SCXI 1357 conn the m

		Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 9 adapt SCXI- 1357/ conne the m Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 9 adapt SCXI- 1357/ conne the m Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 9 adapt SCXI- 1357/ conne the m Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 9 adapt SCXI- 1357/ conne the m Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 adapt SCXI- 1357/ conne the m Slot 9
Rear	Rear Connector Module 10	Pin 9

Connector Module 10	(NISWITCH_VAL_REARCONNECTOR_MODULE10)	adapt SCXI- 1357/ conne the m Slot 1
Rear Connector	Rear Connector Module 11 (NISWITCH VAL REARCONNECTOR MODULE11)	Pin 9 adapt
Module 11		SCXI
		1357/
		conne the m
		Slot 1
Rear	Rear Connector Module 12	Pin 9
Connector Module 12	(NISWITCH_VAL_REARCONNECTOR_MODULE12)	adapt SCXI-
		1357/
		conne
		the m
		Slot 1

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1166 Relay Replacement

The NI SCXI-1166 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number
Aromat (NAiS)	TQ2SA-5V

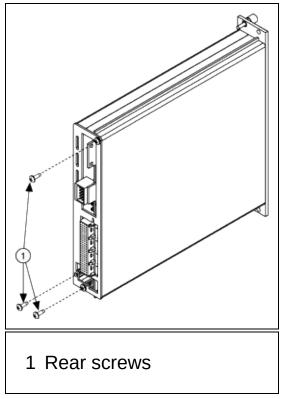
Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

1. Ground yourself using a grounding strap or a ground connected to your SCXI Chassis.

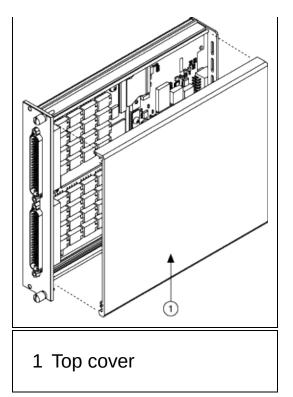


- **Note** Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the two screws from the back of the module.

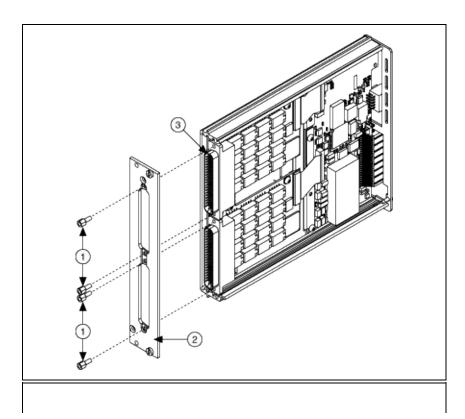


3. Carefully remove the top cover of the module using a flathead screwdriver.

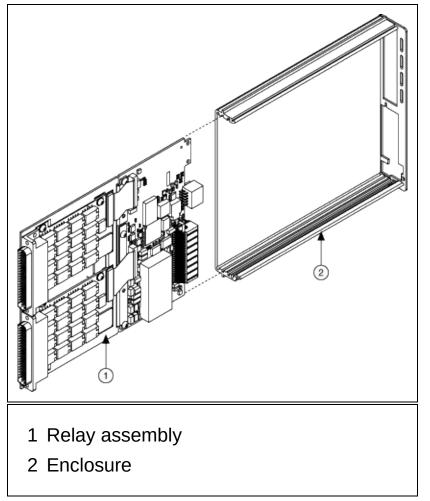




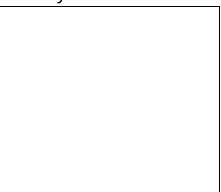
- 4. Remove the rear panel.
- 5. Remove the four jack sockets connecting the front panel to the daughterboard connector.



- 1 Jack sockets 3 Daughterboard connector
- 2 Front panel
- 6. Slide the assembly out of the enclosure.



7. Locate the relay you want to replace. Refer to the following figure for relay locations.



	CH2 CH6			e P
CH11	CH10	CH9	CH8	TOP CARD
CH15 CH19				ן ז
	CH18 CH22			BOTTOM CARD
	CH26			BOTTC
CH31	CH30	CH29	CH28	

Replace the Relay

Before you begin, make sure you have the following items:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI SCXI-1167

The NI SCXI-1167 is a 64-channel general-purpose relay driver module for the SCXI platform designed to handle up to 0.6 A drive current and up to 50 V of drive voltage. The SCXI-1167 also has a <u>source</u> available for driving relays. The NI SCXI-1167 does not support routing signals to the <u>high-voltage analog bus</u>.



Note Using two channels per relay, the NI SCXI-1167 can also control 32 two-coil latching relays.

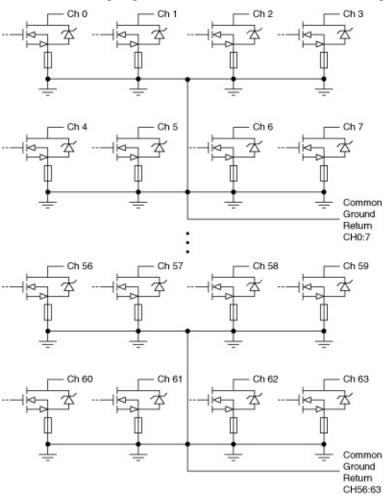
Operation Modes

The following table lists the supported topology of the NI SCXI-1167 and possible <u>operation modes</u>.

Topology	Software Name	Immedia
Independent	1167/Independent	~
	(NISWITCH_TOPOLOGY_1167_INDEPENDENT)	

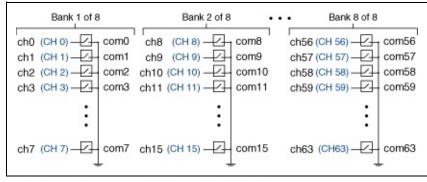
NI SCXI-1167 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1167.



NI SCXI-1167 Independent Topology

The following figure represents the NI SCXI-1167 topology.

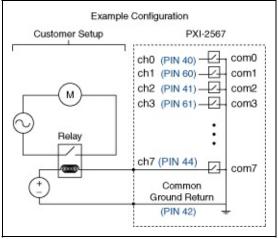


Legend: Software Name (Hardware Name)

Making a Connection

To drive your relay, use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to actuate a relay connected to channel 7, you can connect the positive terminal of your voltage source to one side of the relay coil and connect the other relay coil terminal to pin 44 of the front connector. Then connect the negative terminal of your voltage source to the common ground return of channel 7 (pin 42). Closing the channel 7 driver completes the circuit, driving your relay. Refer to the following figure.



Legend: Software Name (Hardware Name)

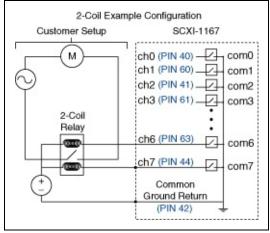
To close the channel 7 relay, call niSwitch_Connect(vi, "ch7", "com7").

Alternatively, you can open and close relays by calling the <u>niSwitch Relay</u> <u>Control</u> VI or the <u>niSwitch_RelayControl</u> function. For the relay name, enter K0 for **channel 0**, K1 for **channel 1**, and so on.

When <u>scanning</u> the NI SCXI-1167, a typical <u>scan list</u> entry could be ch2->com2;. This entry drives the relay connected to channel 2.

Driving 2-Coil Relays

The following figure shows an example of a configuration using the NI SCXI-1167 to drive a 2-coil relay.



Legend: Software Name (Hardware Name)

To close the relay in this example, you would call niSwitch_Connect(vi, "ch7", "com7"). To open the relay, then you would call niSwitch_Disconnect(vi, "ch7", "com7") and then niSwitch_Connect(vi, "ch6", "com6").

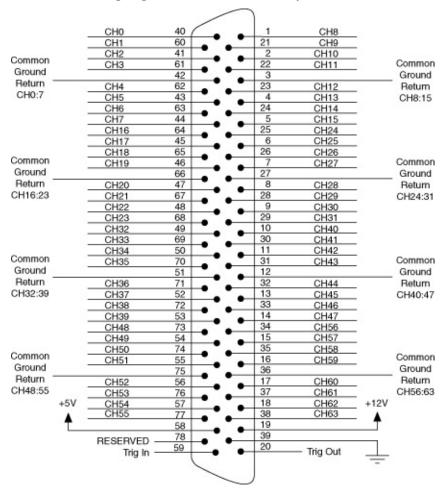
Alternatively, you can actuate the relay by calling the <u>niSwitch Relay</u> <u>Control</u> VI or the <u>niSwitch_RelayControl</u> function. To close the relay in this example, you would call niSwitch_RelayControl(vi, K7,

NISWITCH_VAL_CLOSE_RELAY) to power on the lower coil in the diagram. Then call niSwitch_RelayControl(vi, K7,

NISWITCH_VAL_OPEN_RELAY) to power off the lower coil, and call niSwitch_RelayControl(vi, K6, NISWITCH_VAL_CLOSE_RELAY) power on the other coil and open the relay.

Pinout

The following figure identifies the pins for the NI SCXI-1167.



Available 5 V Source

The SCXI-1167 has a 5 V source available to drive relays. The source, available on pin 58, can provide up to 0.75 A of current.

NI SCXI-1167 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI SCXI-1167.

Trigger Input	Software	На
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG 59
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 adapt SCXI- 1357/
Front Connector	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front termir

Module 1		of the Slot
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Fron term of the Slot
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Fron term of the Slot
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Fron term of the Slot
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Fron term of the Slot
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Fron term of the Slot
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Fron term of the Slot
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Fron term of the Slot
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Fron term of the Slot
Front Connector	Front Connector Module 10 (NISWITCH VAL FRONTCONNECTOR MODULE10)	Fron

Module 10		of the Slot
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Fron termi of the Slot
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	From term of the Slot
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 adap SCX 1357 conn the n Slot
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 6 adap SCX 1357 conn the n Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 adap SCX 1357 conn the n Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 adap SCX 1357 conn the n

		Slot
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 6 adap SCX 1357 conr the r Slot
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 6 adap SCX 1357 conr the r Slot
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 adap SCX 1357 conr the r Slot
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 adap SCX 1357 conn the r Slot
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 adap SCX 1357 conr the r Slot
Rear	Rear Connector Module 10	Pin 6

Connector Module 10	(NISWITCH_VAL_REARCONNECTOR_MODULE10)	adapt SCXI- 1357/ conne the m Slot 1
Rear	Rear Connector Module 11	Pin 6
Connector Module 11	(NISWITCH_VAL_REARCONNECTOR_MODULE11)	adapt SCXI-
		1357/
		conne
		the m
		Slot 1
Rear	Rear Connector Module 12	Pin 6
Connector Module 12	(NISWITCH_VAL_REARCONNECTOR_MODULE12)	adapt SCXI-
		1357/
		conne
		the m
		Slot 1

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI SCXI-1167.

Scan Advanced Output	Software	На
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI line 7
	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG pin 2(
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 adapt SCXI- 1357/
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front termir of the

		Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front termir of the Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front termir of the Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front termir of the Slot 4
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Front termir of the Slot 5
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Front termir of the Slot 6
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Front termir of the Slot 7
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Front termir of the Slot 8
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Front termir of the Slot 9
Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Front termir of the

		Slot 1
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Front termir of the Slot 1
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Front termir of the Slot 1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 9 adapt SCXI- 1357/ conne the m Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 9 adapt SCXI- 1357/ conne the m Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 9 adapt SCXI- 1357/ conne the m Slot 4

Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 9 adapt SCXI 1357 conne the m Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 9 adapt SCXI 1357/ conne the m Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 9 adapt SCXI 1357/ conne the m Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 9 adapt SCXI 1357/ conne the m Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 adapt SCXI 1357/ conne the m Slot 9
Rear Connector	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 9 adap

Module 10		SCXI- 1357/ conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1169

The NI SCXI-1169 is a 100-channel <u>general-purpose</u> module for the SCXI platform. The SCXI-1169 is composed of 100 <u>electromechanical</u> <u>armature</u> latching <u>SPST</u> relays.



Note For EMC compliance, operate this device with shielded cables.

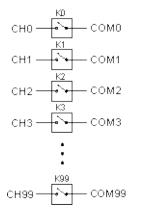
Operation Modes

The following table lists the supported topology of the NI SCXI-1169 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scai
<u>100-</u>	1169/100-SPST	~	
<u>SPST</u>	(NISWITCH_TOPOLOGY_1169_100_SPST)		

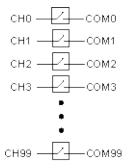
NI SCXI-1169 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1169.



NI SCXI-1169 100-SPST Topology

The following figure represents the NI SCXI-1169 in the 100-SPST topology.



Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function.

For example, to close the relay of channel 2, call niSwitch_Connect(vi, "ch2", "com2"). To open the relay of channel 2, call niSwitch_Disconnect(vi, "ch2", "com2").

When scanning the NI SCXI-1169, a typical scan list entry could be ch_{2-} >com₂;. This entry closes the relay between CH₂ and COM₂.

Pinout

The following figure identifies the pins for the NI SCXI-1169 in the 100-SPST topology.

						_		`		
		COM0		150				51 0	CH1	
CH0	<u> </u>		~	151	-0	71	0	50	0	COM1
CH2	<u> </u>	COM2	~	152	-0	71	0-	49 0 53	CH3 0	COM3
CH4		COM4	~	153	-0	٦Ľ	0-	48 0	CH5 0	COM5
CH6	-	COM6	0-	147 154	-0	٦ï	-	54 47 0	CH7	COM7
		COM8	0	146	-	٦ï		55 46 0	CH9	
CH8	•	COM10	0	145 156	•		0	56 45 0	CH11	COM9
CH10	•	COM12	~	144	•	71	0-	57 44 0	CH13	COM11
CH12	0	COM14	~	143	-0	71	0-	58	CH15	COM13
CH14	•	COM16	-	158 142	-•	7[<u> </u>	43 -	CH17	COM15
CH16	<u> </u>		0	159 141	-0	J	0	42 0 60		COM17
CH18	o	COM18	0	160 140	-0	71	0-	41 O	CH19 0	COM19
CH20		COM20	0	161	-0	7[0-	40 0	CH21	COM21
	•	COM22	0-	139 162	-0	71	0-	62 39 0	CH23	
CH22	<u> </u>	COM24	0	138 163	-	71	-	63 38 0	CH25	COM23
CH24	•	COM26	~	137 164	•		0	64 37 0	CH27	COM25
CH26	0	COM28	0	136	•	-11	0	65	CH29	COM27
CH28	<u> </u>	COM30	0	165 135	•	71	0-	36 66	CH31	COM29
CH30	•		-	166 134	-0	71	0-	35 - 67	CH33	COM31
CH32	o	COM32	0	167 133	-0	٦ľ	0-	34 O 68	0	COM33
CH34	<u> </u>	COM34	0	168	-0	71	0-	33 O	CH35	COM35
CH36	<u> </u>	COM36	0	169	-	71	0	32 0	CH37	COM37
		COM38	<u> </u>	131	-0	٦ſ	0-	70 31 0	CH39	
CH38	°	COM40	0	130	-			71 30 0	CH41	COM39
CH40	°—	COM42	0	129 172	•	4	0-	72 29 0	CH43	COM41
CH42	0	COM44	~	128	•	11	0	73	CH45	COM43
CH44	o	COM46	0	173	•	71	0-	74	CH47	COM45
CH46	o		<u> </u>	174	-0	11	0	27	0	COM47
CH48	<u> </u>	COM48	0	175 125	-0	71	0-	26 0 76	CH49 0	COM49
CH50	-	COM50	~	176	-0	71	0	25 0 77	CH51	COM51
CH52		COM52	0	177	-0	71	0-	24 0	CH53	COM53
		COM54	0	123 178	-	٦ï		78 23 0	CH55	
CH54	°	COM56	0	122 179	•	Ĵ	0-	79 22 0	CH57	COM55
CH56	<u> </u>	COM58	0	121 180	•		0	80 21 0	CH59	COM57
CH58	0	COM60	~	120	•	11	0	81	CH61	COM59
CH60	•—	COM62	-	181 119	-•	11	0-	20 82	CH63	COM61
CH62	<u> </u>			182	-0	71	-	19 83	0	COM63
CH64	<u> </u>	COM64	~	183 117	•	7[0-	18 O	CH65	COM65
CH66	<u> </u>	COM66	0	184		7[0-	17 0	CH67	COM67
CH68	<u> </u>	COM68	0	116 185	-0	71	0-	85 16 0	CH69	COM69
		COM70	•	115 186		٦ï		86 15 0	CH71	
CH70	°	COM72	0	114 187	•			87 o	CH73	COM71
CH72	°	COM74	0	113	•		0	88 0	CH75	COM73
CH74	o	COM76	~	112	•	-11	0	89	CH77	COM75
CH76	<u> </u>	COM78	-	189 111	-0	11	<u> </u>	90	CH79	COM77
CH78	<u> </u>		_	190 110	-0	7[0-	11 0 91	0	COM79
CH80	<u> </u>	COM80	0	191	-0	7[0	10 0	CH81	COM81
CH82	<u> </u>	COM82	0	192	-0	71	0-	92 o	CH83	COM83
	0	COM84	0	108 193	-	٦ï		93 O 8	CH85	
CH84	-	COM86	0	107 194	-0		0-	94 o	CH87	COM85
CH86	0	COM88	0	106	•	6	0	95 0	CH89	COM87
CH88	<u> </u>	COM90	0	195 105	•	-11		6 96 o	CH91	COM89
CH90	o	COM92	-	196 104	-0	71	0-	5 97 o	СН93	COM91
CH92	<u> </u>			197 103	•	7[0	4		COM93
CH94	<u> </u>	COM94	0	198	-0	7[0-	3	CH95	COM95
CH96	<u> </u>	COM96	0	199	-	71		99 0 2	CH97	COM97
		COM98	0-	101 200	-0	71		100 o	CH99	
CH98					C				0	COM99
						-	\sim	·		

NI SCXI-1169 Triggering

Trigger Input

The following table shows valid trigger inputs for the NI SCXI-1169.

Trigger Input	Software	Hare
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI tr line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI tr line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI tr line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI tr line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI tr line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI tr line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI tr line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI tr line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 o adapte SCXI- 1357/1:
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 o adapte SCXI- 1357/1:

		connect the mo Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 6 c adapte SCXI- 1357/1 connec the mo

		Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 10
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 11
Rear	Rear Connector Module 12	Pin 6 d

Connector	(NISWITCH_VAL_REARCONNECTOR_MODULE12)	adapteı
Module 12		SCXI-
		1357/1;
		connec
		the mod
		Slot 12

Scan Advanced Output

The following table shows valid scan advanced outputs for the NI SCXI-1169.

Scan Advanced Output	Software	Har
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI tr line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI tr line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI tr line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI tr line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI tr line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI tr line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI tr line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI tr line 7
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 o adapte SCXI- 1357/1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 9 o adapte SCXI- 1357/1 connec the mo

		Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 9 adapte SCXI- 1357/2 conne the me Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 9 adapte SCXI- 1357/2 conne the me Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 9 adapte SCXI- 1357/ conne the me Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 9 adapte SCXI- 1357/ conne the me Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 9 adapte SCXI- 1357/2 conne the me Slot 6
Rear	Rear Connector Module 7	Pin 9

Connector Module 7	(NISWITCH_VAL_REARCONNECTOR_MODULE7)	adapt SCXI- 1357/ conne the m Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 9 adapt SCXI- 1357/ conne the m Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 adapt SCXI- 1357/ conne the m Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 9 adapt SCXI-

		1357/1
		connec
		the mo
		Slot 12

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1169 Relay Replacement

The NI SCXI-1169 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

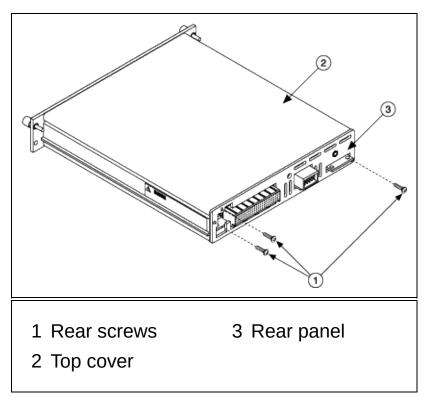
Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

Relay Kit	Part Number
National Instruments (10 relays)	779356-01

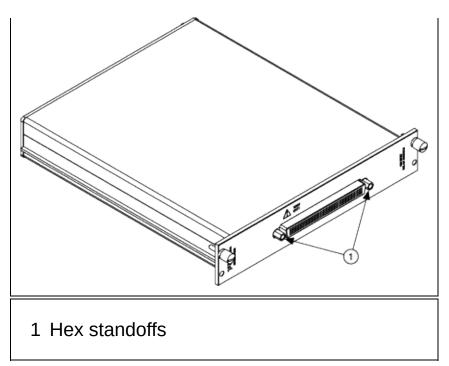
Complete the following sets of steps to disassemble your module and replace a failed relay.

Disassemble the Module

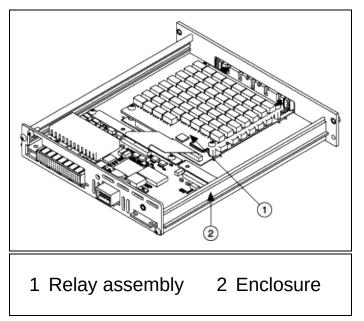
- 1. Ground yourself using a grounding strap or a ground connected to your SCXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the three rear screws from the back of the module.



- 3. Carefully remove the top cover of the module using a flathead screwdriver.
- 4. Remove the rear panel.
- 5. Remove the hex standoffs from the front of the module.

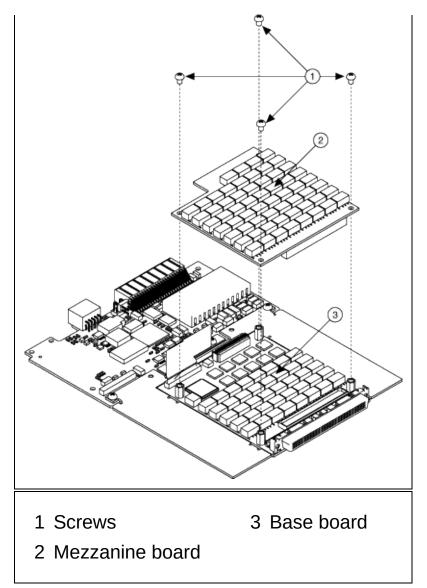


6. Slide the relay assembly out of the enclosure.



7. Remove the four screws that secure the mezzanine board to the base board.

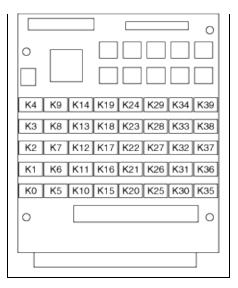




- 8. Separate the mezzanine board from the base board.
- 9. Locate the relay you want to replace. Refer to the following figures and table for relay locations.

Base Board





Mezzanine Board

							0
0				K75	K83	K91	K99
K46	K53	K60	K67	K74	K82	K90	K98
K45	K52	K59	K66	K73	K81	K89	K97
K44	K51	K58	K65	K72	K80	K88	K96
K43	K50	K57	K64	K71	K79	K87	K95
K42	K49	K56	K63	K70	K78	K86	K94
K41	K48	K55	K62	K69	K77	K85	K93
K40	K47	K54	K61	K68	K76	K84	K92
0							0

Channel Name	Relay Name	Channel Name	Relay Name	Channel Name	Relay Name		Relay Namo
CH0	K0	CH25	K25	CH50	K50	CH75	K75
CH1	K1	CH26	K26	CH51	K51	CH76	K76
CH2	K2	CH27	K27	CH52	K52	CH77	K77
CH3	K3	CH28	K28	CH53	K53	CH78	K78
CH4	K4	CH29	K29	CH54	K54	CH79	K79
CH5	K5	CH30	K30	CH55	K55	CH80	K80
CH6	K6	CH31	K31	CH56	K56	CH81	K81
CH7	K7	CH32	K32	CH57	K57	CH82	K82
				l			

CH8	K8	CH33	K33	CH58	K58	CH83	K83
CH9	K9	CH34	K34	CH59	K59	CH84	K84
CH10	K10	CH35	K35	CH60	K60	CH85	K85
CH11	K11	CH36	K36	CH61	K61	CH86	K86
CH12	K12	CH37	K37	CH62	K62	CH87	K87
CH13	K13	CH38	K38	CH63	K63	CH88	K88
CH14	K14	CH39	K39	CH64	K64	CH89	K89
CH15	K15	CH40	K40	CH65	K65	CH90	K90
CH16	K16	CH41	K41	CH66	K66	CH91	K91
CH17	K17	CH42	K42	CH67	K67	CH92	K92
CH18	K18	CH43	K43	CH68	K68	CH93	K93
CH19	K19	CH44	K44	CH69	K69	CH94	K94
CH20	K20	CH45	K45	CH70	K70	CH95	K95
CH21	K21	CH46	K46	CH71	K71	CH96	K96
CH22	K22	CH47	K47	CH72	K72	CH97	K97
CH23	K23	CH48	K48	CH73	K73	CH98	K98
CH24	K24	CH49	K49	CH74	K74	CH99	K99

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

P

Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI SCXI-1175

The NI SCXI-1175 is a 196×1 multiplexer relay module for the SCXI platform. The SCXI-1175 is composed of 99 <u>SPST</u> and 1 <u>SPDT</u> <u>armature</u> latching relays.



Note For EMC compliance, operate this device with shielded cables.

Operation Modes

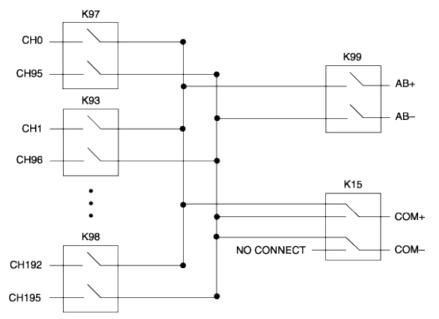
The following table lists the supported topologies of the NI SCXI-1175 and possible <u>operation modes</u>.

Topology	Software Name	Imn
<u>1-Wire</u> <u>196×1</u> Multiplexer	1175/1-Wire 196x1 Mux (NISWITCH_TOPOLOGY_1175_1_WIRE_196X1_MUX)	
2-Wire <u>98×1</u> Multiplexer	1175/2-Wire 98x1 Mux (NISWITCH_TOPOLOGY_1175_2_WIRE_98X1_MUX)	
2-Wire 95×1 Multiplexer	1175/2-Wire 95x1 Mux (NISWITCH_TOPOLOGY_1175_2_WIRE_95X1_MUX)	
Note	When using either the SH200LFH-4xDB50F-S or	<u> </u>

Note When using either the SH200LFH-4xDB50F-S or SH200LFH-BARE WIRE cable with the NI SCXI-1175 in the 2-wire 98×1 topology, CH95, CH96, and CH97 will have lower RF performance than the other 95 channels because they are not in twisted pairs in the cable. To avoid using these channels, NI-SWITCH has support for a 2-wire 95×1 topology that does not include CH95, CH96, and CH97.

NI SCXI-1175 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1175.



Note Connecting to the <u>High-Voltage Analog Bus</u> is only supported in the <u>2-wire 98x1 multiplexer</u> and <u>2-wire 95x1 multiplexer</u> topologies.

The following table lists channel pairings and relay assignments for the NI SCXI-1175.

	196×1 el Name	2-Wire 95×1 Channel Name	2-Wire 98×1 Channel Name	Relay Number
CH0	CH95	CH0	CH0	K97
CH1	CH96	CH1	CH1	K93
CH2	CH97	CH2	CH2	K89
CH3	CH98	CH3	CH3	K85
CH4	CH99	CH4	CH4	K81
CH5	CH100	CH5	CH5	K77
CH6	CH101	CH6	CH6	K73
CH7	CH102	CH7	CH7	K69
CH8	CH103	CH8	CH8	K65
CH9	CH104	CH9	CH9	K61

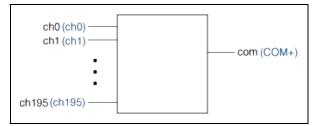
CH10	CH105	CH10	CH10	K57
CH11	CH106	CH11	CH11	K53
CH12	CH107	CH12	CH12	K47
CH13	CH108	CH13	CH13	K44
CH14	CH109	CH14	CH14	K40
CH15	CH110	CH15	CH15	K39
CH16	CH111	CH16	CH16	K32
CH17	CH112	CH17	CH17	K28
CH18	CH113	CH18	CH18	K24
CH19	CH114	CH19	CH19	K20
CH20	CH115	CH20	CH20	K16
CH21	CH116	CH21	CH21	K11
CH22	CH117	CH22	CH22	K7
CH23	CH118	CH23	CH23	K3
CH24	CH119	CH24	CH24	K52
CH25	CH120	CH25	CH25	K56
CH26	CH121	CH26	CH26	K60
CH27	CH122	CH27	CH27	K64
CH28	CH123	CH28	CH28	K68
CH29	CH124	CH29	CH29	K72
CH30	CH125	CH30	CH30	K76
CH31	CH126	CH31	CH31	K80
CH32	CH127	CH32	CH32	K84
CH33	CH128	CH33	CH33	K87
CH34	CH129	CH34	CH34	K91
CH35	CH130	CH35	CH35	K95
CH36	CH131	CH36	CH36	K2
CH37	CH132	CH37	CH37	K6
CH38	CH133	CH38	CH38	K10
CH39	CH134	CH39	CH39	K14

CH40	CH135	CH40	CH40	K19
CH41	CH136	CH41	CH41	K23
CH42	CH137	CH42	CH42	K27
CH43	CH138	CH43	CH43	K31
CH44	CH139	CH44	CH44	K35
CH45	CH140	CH45	CH45	K38
CH46	CH141	CH46	CH46	K43
CH47	CH142	CH47	CH47	K46
CH48	CH143	CH48	CH48	K96
CH49	CH144	CH49	CH49	K92
CH50	CH145	CH50	CH50	K88
CH51	CH146	CH51	CH51	K83
CH52	CH147	CH52	CH52	K79
CH53	CH148	CH53	CH53	K75
CH54	CH149	CH54	CH54	K71
CH55	CH150	CH55	CH55	K67
CH56	CH151	CH56	CH56	K63
CH57	CH152	CH57	CH57	K59
CH58	CH153	CH58	CH58	K55
CH59	CH154	CH59	CH59	K51
CH60	CH155	CH60	CH60	K45
CH61	CH156	CH61	CH61	K42
CH62	CH157	CH62	CH62	K37
CH63	CH158	CH63	CH63	K34
CH64	CH159	CH64	CH64	K30
CH65	CH160	CH65	CH65	K26
CH66	CH161	CH66	CH66	K22
CH67	CH162	CH67	CH67	K18
CH68	CH163	CH68	CH68	K13
CH69	CH164	CH69	CH69	K9

CH70	CH165	CH70	CH70	K5
CH71	CH166	CH71	CH71	K1
CH72	CH167	CH72	CH72	K50
CH73	CH168	CH73	CH73	K54
CH74	CH169	CH74	CH74	K58
CH75	CH170	CH75	CH75	K62
CH76	CH170	CH76	CH76	K66
CH77	CH172	CH77	CH77	K70
CH78	CH173	CH78	CH78	K74
CH79	CH174	CH79	CH79	K78
CH80	CH175	CH80	CH80	K82
CH81	CH176	CH81	CH81	K86
CH82	CH177	CH82	CH82	K90
CH83	CH178	CH83	CH83	K94
CH84	CH179	CH84	CH84	K0
CH85	CH180	CH85	CH85	K4
CH86	CH181	CH86	CH86	K8
CH87	CH182	CH87	CH87	K12
CH88	CH183	CH88	CH88	K17
CH89	CH184	CH89	CH89	K21
CH90	CH185	CH90	CH90	K25
CH91	CH186	CH91	CH91	K29
CH92	CH187	CH92	CH92	K33
CH93	CH188	CH93	CH93	K36
CH94	CH189	CH94	CH94	K41
CH190	CH193		CH95	K48
CH191	CH194		CH96	K49
CH192	CH195		CH97	K98
		COM Relay		K15
_	Relay	K99		

NI SCXI-1175 1-Wire 196×1 Multiplexer Topology

The following figure represents the NI SCXI-1175 in the 1-wire 196×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to close the relay of channel 1, call niSwitch_Connect(vi, "ch1", "com"). To open the relay of channel 1, call niSwitch_Disconnect(vi, "ch1", "com").

When scanning the NI PXI-2575, a typical scan list entry could be ch1-com;. This entry closes the relay between CH1 and COM.

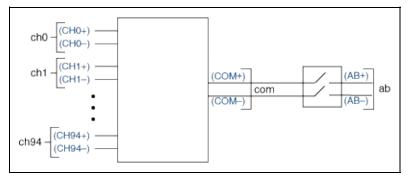
Pinout

The following figure identifies the pins for the NI SCXI-1175 in the 1-wire 196×1 multiplexer topology.

					_	_	-					
	NO CONNECT	<u>~</u>	150	\bigcap				51	0	CH36		
CH84	0	-	151 149	-0	2	ſ	0-	50 52			0	NO CONNECT
CH179	0	0	152 148	-0	9	6	0-	49 53	-0	CH131		CH118
CH85	0	0	153 147	-0	J	ſ	0-	48 54	-0	CH37	0	CH23
CH180	0	0	154 146	-0	J	6	0-	47	-0	CH132	0	CH117
CH86	CH70	0	155	-0	J	5	0-	46	-0	CH38	0	CH22
CH181	CH164	0-	156		7	ſ	0	45	-0	CH133	0	CH116
CH87	CH69	0	157	-0	٦	[0	44	-0	CH39	0	CH21
CH182	CH163	0	143 158	-0	٦	[0-	58 43	-0	CH134	0	CH115
CH88	CH68	0	142 159	-0	٦	ŗ	0	59 42	-0	CH40	0	CH20
	CH162	0	141 160	0		_	~ ~	60 41	-0	CH135	0	
CH183	0 CH67	0	140 161		ہ 	ь Г	-	61 40	-0	CH41		CH114
CH89	0	0	139 162	-0	6 	6	0	62 39	-0	CH136	0	CH19
CH184	O	0	138 163	-0	ہ 	6 [0-	63 38	-0	CH42	0	CH113
CH90	0	0	137	-0	0 	6	0-	64 37	_0	CH137	0	CH18
CH185	0	0	136	-0	9	6	0-	65	-0	CH43	0	CH112
CH91	0	0	165	0	9	6	0-	36 66	_0	CH138	0	CH17
CH186	O-CH64	~	166 134	-0	4	6	0-	35 67	_0	CH44	0	CH111
CH92	0	~ ~	167 133	-0	9	6	0-	34 68		CH139	0	CH16
CH187	0		168 132	-0	1	5	0-	33 69			0	CH110
CH93	0	0	169 131	-0	0	[0-	32 70	-0	CH45	0	CH15
CH188	CH157	0	170 130	0	0	ſ	0-	31 71	0	CH140	0	CH109
CH94	CH62	0	171	0	7	Γ	0	30 72	-0	CH46	0	CH14
CH189	CH156	0	172	-0	J	5	0	29	-0	CH141	0	CH108
COM	CH61	0	128		7	Ľ	0	73 28	-0	CH47	0	CH13
NO CONNECT	CH155	0	127 174	-0	٦	5	0	74 27	-0	CH142	0	CH107
CH190	CH60	0-	126 175	-0	J	ŗ	~	75 26	-0	CH191	0	CH12
CH72	CH193	0	125 176	0	٦	ŗ	°	76 25	-0	CH24	0	CH12
	CH154	0	124 177				~	77 24	-0	CH119		
CH167	CH59	0-	123 178		ہ _	6 [78 23	-0	CH25	0	CH106
CH73	0	0	122 179	0	6 	6 [0	79 22	-0	CH120	0	CH11
CH168	O-CH58	0	121 180	-0	6 	6	0	80 21	-0	CH26	0	CH105
CH74	0	0	120	0	6 	ò	0-	81 20	-0	CH121	0	CH10
CH169	O	0	119	-0		6	0	82	-0	CH27	0	CH104
CH75	0	0	118	0	4	6	0	19 83	_0	CH122	0	CH9
CH170	0	0	183	-0	6	6	0	18 84	_0	CH28	0	CH103
CH76	0	~ ~	184 116	-0	9	6	0-	17 85	_0	CH123	0	CH8
CH171	0	~	185 115	-0	6	0	0-	16 86		CH29	0	CH102
CH77	0	_	186 114	-0	J	6	0-	15 87			0	CH7
CH172	0	0	187 113	-0]	ļ	0-	14 88	-0	CH124		CH101
CH78	0	0	188 112	-0	٦	ſ	0-	13 89	-0	CH30	o	CH6
CH173	CH148	<u>~</u>	189	-0	٦	[0-	12	-0	CH125	0	CH100
CH79	0	0	190	-0	J	5	0	11	-0	CH31	0	CH5
CH174	CH147	0	110		7	Γ	0	91 10	-0	CH126	0	CH99
CH80	CH52	0	109 192			ſ	0	92 9	-0	CH32	0	CH4
CH175	CH146	0	108 193	-0				93 8	-0	CH127	0	CH98
	CH51	0-	107 194	-				94 7	-0	CH33		
CH81	0 CH145	0-	106 195	0		ь Г	0	95 6	-0	CH128	0	CH3
CH176	0 CH50	0	105 196	0		ь Г	0	96 5	-0	CH34	0	CH97
CH82	0	0	104	-0		6	0	97	-0	CH129	0	CH2
CH177	0	0-	103	0		6	0-	-4 98 3	-0	CH35	0	CH96
CH83	0	0	102	0	_	6	0-	99	-0	CH130	0	CH1
CH178	0	0	199	-0	4	6	0-	2	_0	CH195	0	CH95
CH192	0	-	200	to	9	9	0	1			0	CH0
				_	_	~	\mathcal{I}					

NI SCXI-1175 2-Wire 95×1 Multiplexer Topology

The following figure represents the NI SCXI-1175 in the 2-wire 95×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

During scanning, a typical scan list entry is ch2->com;. This entry routes the signal connected to CH2+ and CH2– to COM+ and COM–, respectively.

You can also route both signals (COM+ and COM–) to the <u>High-Voltage</u> <u>Analog Bus</u> (AB+ and AB–) by using the scan list command com->ab, or by using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters com and ab.

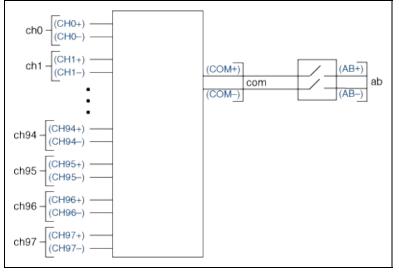
Pinout

The following figure identifies the pins for the NI SCXI-1175 in the 2-wire 95×1 multiplexer topology.

			\sim	~			
CH84+	NO CONNECT O-	150 151	-) o-	51 o CH36+	NO CONNECT
CH84+	CH71- 0-	149 152	6	。。][49 0 CH36-	CH23-
CH85+	CH71+ 0-	148 153		7,		48 0 CH37+	CH23+
CH85-	CH70- o-	147 154	-0	7,		47 o CH37-	CH22-
CH86+	CH70+ o-	146 155	-0	7,		46 O CH38+	
CH86-	CH69- 0-	145 156	-			56 o CH38-	or the second seco
	CH69+ o	144 157	-	ەە 1 ר		44 D CH39+	
CH87+	о	143 158	0	ەە 11		58 o CH39-	
CH87-	0	142 159	-0	ه ه ۱ ۲		59 0 CH40+	
CH88+	о	141 160	-0	ہ ہ ۱ آ		60 0 CH40-	
CH88-	o CH67+ o	140 161	•	ەە 1 1		61 O CH41+	
CH89+	о	139 162	-0	ہ ہ 1 1		62 O CH41-	
CH89-	°−−−− CH66+ °−−	138 163	-0	ە ە 1 ר		63 o CH42+	
CH90+	о	137	-0	66 1 C		64 o CH42-	
CH90-	о	136	-0	ہ ہ ۱ ר		65 o CH43+	
CH91+	0	135	-0	66 1 C		66 0 CH43-	• CH17+
CH91-	CH64+ o	134	-0	66 1 C		67 CH44+	CH16-
CH92+	о	167 133 168	-0	66) o-	68 CH44-	CH16+
CH92-		132	•	66	>	69 CH45+	CH15-
CH93+	0	131	•	6	- o	70 CH45-	OH15+
CH93-	o	170 130	•	99) O-	71 0 CH46+	CH14-
CH94+	0	171	-0	6	> 0-	72 0 CH46-	CH14+
CH94-	0	172 128	0	66	> ~	73 CH47+	CH13-
COM+	o	173	0	6) o-	74 CH47-	CH13+
COM-		174 126	-0	6) o-	75 NO CONNECT	CH12-
NO CONNECT		175 125	-0	6) o-	76 CH24+ C	CH12+
CH72+		176 124	0	99) o-		NO CONNECT
CH72-	0	177 123	0	99	> 0-	78 0 CH25+	CH11-
CH73+	0	178 122	0	7	→	79 0 CH25-	CH11+
CH73-	0	179 121	-0	7) o-	80 0 CH26+	CH10-
CH74+	0	180 120	-0	7) o-	81 0 CH26=	CH10+
CH74-	0	181 119	-0	7		20 0 CH27+	CH9-
CH75+	0	182 118	-0	7) o-	19	CH9+
CH75-	CH56- 0-	183 117	-0][>	18 0 CH27- 84 0 CH28+	CH8-
CH76+	CH56+ 0-	184 116	-0	7) o-		GH8+
CH76-		185 115	-0	71) o-	16 CH28-	CH7-
CH77+		186 114	-0	71	- o	15 O CH29+	CH7+
CH77-		187 113	0	71) o-	14 CH29-	CH6-
CH78+		188	0	7,	, o-	13 O CH30+	CH6+
CH78-		189	0	7,) o-	12 0 CH30-	CH5-
CH79+	CH53+ 0-	190 110	-0][) o-	11 0 CH31+	CH5+
CH79-	CH52- 0-	191	-0	7		10 0 CH31-	CH4-
CH90+	CH52+ 0-	192	-0	7) o-	9 0 CH32+	CH4+
CH80-	CH51- 0-	193	-0	7) o-		CH3-
CH81+	CH51+ 0	194	-0	71			CH3+
CH81-	CH50- o-	106 195	-0	7,		95 o CH33-	CH2-
	CH50+ c	105 196	-0	7,		96 o CH34+	CH2+
CH82-	CH49- 0	104 197	-0	71		97 o CH34- 4	CH1-
	CH49+ 0-	103 198	0	71		3 O CH35+	CH1+
CH83-	CH48- 0	102 199	0	71		2 0 CH35-	CH0-
unida-	CH48+ 0	101	Ľ			100 ONO CONNECT	
NO CONNECT	0	200	<u>-</u> 0	99	- o-	1	CH0+

NI SCXI-1175 2-Wire 98×1 Multiplexer Topology

The following figure represents the NI SCXI-1175 in the 2-wire 98×1 multiplexer topology.



Legend: Software Name (Hardware Name)

Making a Connection

During scanning, a typical scan list entry is ch2->com;. This entry routes the signal connected to CH2+ and CH2– to COM+ and COM–, respectively.

You can also route both signals (COM+ and COM–) to the <u>High-Voltage</u> <u>Analog Bus</u> (AB+ and AB–) by using the scan list command com->ab, or by using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters com and ab.

Pinout

The following figure identifies the pins for the NI SCXI-1175 in the 2-wire 98×1 multiplexer topology.

							_	-					
	NO CO	ONNECT	~	150		_	_		51		CH36+		
CH84+	0	GH71-	0 0	151 149	-0]	5	0-	50 52	~	CH36-	0	NO CONNECT
CH84-	o	CH71+	°	152 148	-0	9	0	0-	49 53	~	CH37+	0	CH23-
CH85+	0	CH70-	<u> </u>	153 147	-0	6	6	0	48 54		CH37-	0	CH23+
CH85-	0	CH70+	~ o—	154 146	-0	9	0	0-	47 55	-0	CH38+	0	CH22-
CH86+	0	CH69-	-	155 145	-0	6	0	0-	46 56	_0	CH38-	0	CH22+
CH86-	0	CH69+	-	156 144	-0	6	6	0-	45 57	_0	CH39+	0	CH21-
CH87+	ò	CH68-	-	157 143	-0	9	0	0-	44 58	_0	CH39-	0	CH21+
CH87-	0	CH68+	-	158 142	-0	6	0	0-	43 59	_0	CH40+	0	CH20-
CH88+	0	CH67-	0	159 141	-0	6	6	0-	42 60		CH40-	0	CH20+
CH88-	0	CH67+	。 一	160 140	-0	9	6	0-	41 61	~	CH41+	0	CH19-
CH89+	0	CH66-	-	161 139	-0	9	0	0	40 62	~	CH41-	0	CH19+
CH89-	0	CH66+	-	162 138	-0	9	0	0	39 63	~	CH42+	0	CH18-
CH90+	0	CH65-	0 0	163 137	-0]	6	0-	38 64	~	CH42-	0	CH18+
CH90-	0	CH65+		164 136	-0	٦	ſ	0-	37 65		CH43+		CH17-
CH91+	0		_	165 135	-0	٦	ſ	0-	36 66	-0	CH43-	0	CH17+
CH91-	0	CH64-		166 134	-0	٦	ļ	0-	35 67	-0		0	CH16-
CH92+	0	CH64+	0	167 133	-0	٦	ſ	0	34 68	-0	CH44+	o	CH16+
CH92-	o	CH63-	0	168 132	-0	٦	ſ	0	33 69	-0	CH44-	o	CH15-
CH93+	ò	CH63+	0	169 131	-0	٦	ſ	0-	32 70	-0	CH45+		CH15+
CH93-	0	CH62-	0	170 130	-0	٦	ľ	0	31 71	-0	CH45-	0	CH14-
CH94+	o	CH62+	0	171	-0	7	5	0	30 72	-0	CH46+		CH14+
CH94-	0	CH61-	0	172	-0	٦	5	0-	29 73	0	CH46-	0	CH13-
COM+	0	CH61+	0	173	-0	7	Γ	0	28 74	0	CH47+	0	CH13+
COM-	0	CH60-	0	174	-0	٦	ŗ	0	27 75	0	CH47-	0	CH12-
CH95+	o	CH60+	0-	175	-0	٦	ŗ	0	26 76	-0	CH96+	0	CH12+
CH72+	0	CH95-	0	176	-0	-	ŗ	0	25	-0	CH24+	0	CH96-
CH72-	0	CH59-	0-	124	_0	-	ſ	0	24	-0	CH24-	0	CH11-
CH73+	0	CH59+	0—	123 178	-0	_	ŗ	0	78 23	-0	CH25+	0	CH11+
CH73-	0	CH58-	0-	122 179	-0	٦	Г	~	79 22	-0	CH25-	0	CH10-
CH74+	0	CH58+	0-	121 180	-0		5	0	90 21	-0	CH26+	0	CH10+
CH74-	o	CH57-	0—	120 181	_0		ſ		81 20	-0	CH26-	0	CH9-
	o	CH57+	0—	119 182	_0		ŗ	~	82 19	-0	CH27+	0	CH9+
CH75+ CH75-		CH56-	0—	118 183	_0		ſ	~	83 18	-0	CH27-	0	
CH76+		CH56+	0—	117 184			ŗ	~	84 17	-0	CH28+		CH8-
	o	CH55-	0-	116 185	-0	_	ſ	~	85 16	-0	CH28-	0	CH8+
CH76-	o	CH55+	0—	115 186	-0		ŗ	~	86 15	-0	CH29+	0	CH7-
CH77+		CH54-	0	114 187	-0	_	ſ		87 14	-0	CH29-		CH7+
CH77-	o	CH54+	0-	113 188	-0	_		0	88 13	-0	CH30+	0	CH6-
CH78+	0	CH53-	0	112 189	-0	_	ь Г	0	89 12	-0	CH30-	0	CH6+
CH78-	0	CH53+	0-	111 190	-0	_	6 Г	۰	90 11	0	CH31+	0	CH5-
CH79+	0	CH52-	0-	110 191	-0		6	0	91 10	-0	CH31-	0	CH5+
CH79-	0	CH52+	0-	109 192	-0		0	0	92 9	-0	CH32+	0	CH4-
CH80+	0	CH51-	0	108	-0		0	0-	93 8	-0	CH32-	0	CH4+
CH80-	0	CH51+	0	193	-0		0	0-	94	-0	CH33+	0	CH3-
CH81+	0	CH50-	0	106	-0	9	6	0	7 95	-0	CH33-	0	CH3+
CH81-	0	CH50+	0-	195	-0	4	6	0	6 96	-0	CH34+	0	CH2-
CH82+	0	CH49-	0	196 104	-0	4	6	0	5 97	-0	CH34-	0	CH2+
CH82-	0	CH49+	0-	197	-0	9	6	0	4 98	-0	CH35+	0	CH1-
CH83+	0	CH48-	0-	198 102	-0	4	6	0	3 99	-0	CH35-	0	CH1+
CH83-	0	CH48+	0-	199 101	-0	4	6	0	2	_0	CH97-		CH0-
CH97+	0		-	200	-	9	6	0-	1	-		0	CH0+
					_	_	_	\mathcal{I}					

NI SCXI-1175 Triggering

Trigger Input

The following table shows valid trigger inputs for the NI SCXI-1175.

Trigger Input	Software	Hare
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI tr line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI tr line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI tr line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI tr line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI tr line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI tr line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI tr line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI tr line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 o adapte SCXI- 1357/1:
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 o adapte SCXI- 1357/1:

		connect the mo Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 6 c adapte SCXI- 1357/1 connec the mo

		Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 10
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 11
Rear	Rear Connector Module 12	Pin 6 d

Connector	(NISWITCH_VAL_REARCONNECTOR_MODULE12)	adapteı
Module 12		SCXI-
		1357/1;
		connec
		the mod
		Slot 12

Scan Advanced Output

The following table shows valid scan advanced outputs for the NI SCXI-1175.

Scan Advanced Output	Software	Har
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI tr line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI tr line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI tr line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI tr line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI tr line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI tr line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI tr line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI tr line 7
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 o adapte SCXI- 1357/1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 9 o adapte SCXI- 1357/1 connec the mo

		Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 9 adapte SCXI- 1357/2 conne the me Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 9 adapte SCXI- 1357/2 conne the me Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 9 adapte SCXI- 1357/ conne the me Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 9 adapte SCXI- 1357/ conne the me Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 9 adapte SCXI- 1357/2 conne the me Slot 6
Rear	Rear Connector Module 7	Pin 9

Connector Module 7	(NISWITCH_VAL_REARCONNECTOR_MODULE7)	adapt SCXI- 1357/ conne the m Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 9 adapt SCXI- 1357/ conne the m Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 adapt SCXI- 1357/ conne the m Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 9 adapt SCXI-

		1357/1
		connec
		the mo
		Slot 12

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1175 Relay Replacement

The NI SCXI-1175 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

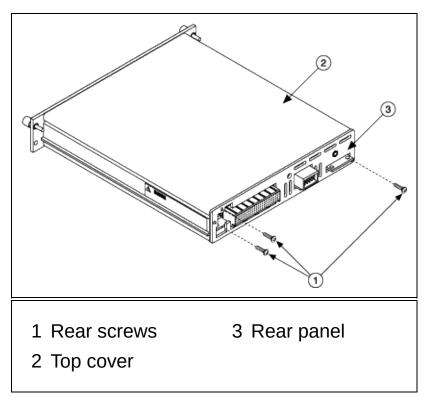
Relay Manufacturer	Part Number
AXICOM (Tyco Electronics)	IM42GR (3-1462037-1)

Relay Kit	Part Number
National Instruments (10 relays)	779356-01

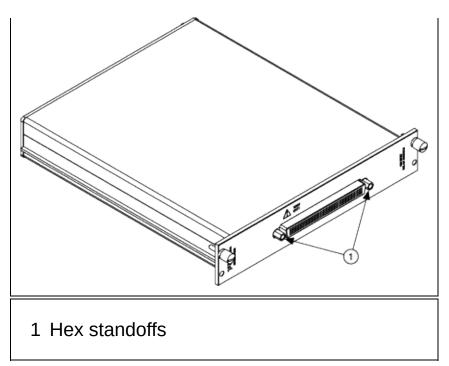
Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

Disassemble the Module

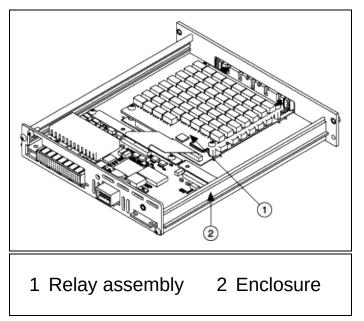
- 1. Ground yourself using a grounding strap or a ground connected to your SCXI chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the three rear screws from the back of the module.



- 3. Carefully remove the top cover of the module using a flathead screwdriver.
- 4. Remove the rear panel.
- 5. Remove the hex standoffs from the front of the module.

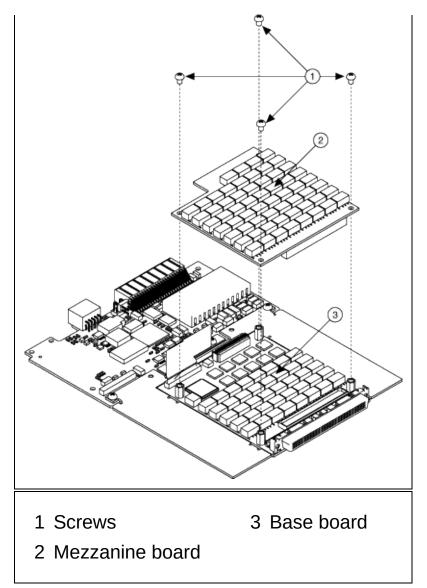


6. Slide the relay assembly out of the enclosure.



7. Remove the four screws that secure the mezzanine board to the base board.

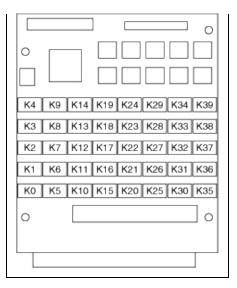




- 8. Separate the mezzanine board from the base board.
- 9. Locate the relay you want to replace. Refer to the following figures and table for relay locations.

Base Board





Mezzanine Board

							0
0			1	K75	K83	K91	K99
K46	K53	K60	K67	K74	K82	K90	K98
K45	K52	K59	K66	K73	K81	K89	K97
K44	K51	K58	K65	K72	K80	K88	K96
K43	K50	K57	K64	K71	K79	K87	K95
K42	K49	K56	K63	K70	K78	K86	K94
K41	K48	K55	K62	K69	K77	K85	K93
K40	K47	K54	K61	K68	K76	K84	K92
0							0

_	196×1 el Name	2-Wire 95×1 Channel Name	2-Wire 98×1 Channel Name	Relay Name
CH0	CH95	CH0	CH0	K97
CH1	CH96	CH1	CH1	K93
CH2	CH97	CH2	CH2	K89
CH3	CH98	CH3	CH3	K85
CH4	CH99	CH4	CH4	K81
CH5	CH100	CH5	CH5	K77
CH6	CH101	CH6	CH6	K73
CH7	CH102	CH7	CH7	K69

CH8	CH103	CH8	CH8	K65
CH9	CH104	CH9	CH9	K61
CH10	CH105	CH10	CH10	K57
CH11	CH106	CH11	CH11	K53
CH12	CH107	CH12	CH12	K47
CH13	CH108	CH13	CH13	K44
CH14	CH109	CH14	CH14	K40
CH15	CH110	CH15	CH15	K39
CH16	CH111	CH16	CH16	K32
CH17	CH112	CH17	CH17	K28
CH18	CH113	CH18	CH18	K24
CH19	CH114	CH19	CH19	K20
CH20	CH115	CH20	CH20	K16
CH21	CH116	CH21	CH21	K11
CH22	CH117	CH22	CH22	K7
CH23	CH118	CH23	CH23	K3
CH24	CH119	CH24	CH24	K52
CH25	CH120	CH25	CH25	K56
CH26	CH121	CH26	CH26	K60
CH27	CH122	CH27	CH27	K64
CH28	CH123	CH28	CH28	K68
CH29	CH124	CH29	CH29	K72
CH30	CH125	CH30	CH30	K76
CH31	CH126	CH31	CH31	K80
CH32	CH127	CH32	CH32	K84
CH33	CH128	CH33	CH33	K87
CH34	CH129	CH34	CH34	K91
CH35	CH130	CH35	CH35	K95
CH36	CH131	CH36	CH36	K2
CH37	CH132	CH37	CH37	K6

CH38	CH133	CH38	CH38	K10
CH39	CH134	CH39	CH39	K14
CH40	CH135	CH40	CH40	K19
CH41	CH136	CH41	CH41	K23
CH42	CH137	CH42	CH42	K27
CH43	CH138	CH43	CH43	K31
CH44	CH139	CH44	CH44	K35
CH45	CH140	CH45	CH45	K38
CH46	CH141	CH46	CH46	K43
CH47	CH142	CH47	CH47	K46
CH48	CH143	CH48	CH48	K96
CH49	CH144	CH49	CH49	K92
CH50	CH145	CH50	CH50	K88
CH51	CH146	CH51	CH51	K83
CH52	CH147	CH52	CH52	K79
CH53	CH148	CH53	CH53	K75
CH54	CH149	CH54	CH54	K71
CH55	CH150	CH55	CH55	K67
CH56	CH151	CH56	CH56	K63
CH57	CH152	CH57	CH57	K59
CH58	CH153	CH58	CH58	K55
CH59	CH154	CH59	CH59	K51
CH60	CH155	CH60	CH60	K45
CH61	CH156	CH61	CH61	K42
CH62	CH157	CH62	CH62	K37
CH63	CH158	CH63	CH63	K34
CH64	CH159	CH64	CH64	K30
CH65	CH160	CH65	CH65	K26
CH66	CH161	CH66	CH66	K22
CH67	CH162	CH67	CH67	K18

CH68	CH163	CH68	CH68	K13
CH69	CH164	CH69	CH69	K9
CH70	CH165	CH70	CH70	K5
CH71	CH166	CH71	CH71	K1
CH72	CH167	CH72	CH72	K50
CH73	CH168	CH73	CH73	K54
CH74	CH169	CH74	CH74	K58
CH75	CH170	CH75	CH75	K62
CH76	CH170	CH76	CH76	K66
CH77	CH172	CH77	CH77	K70
CH78	CH173	CH78	CH78	K74
CH79	CH174	CH79	CH79	K78
CH80	CH175	CH80	CH80	K82
CH81	CH176	CH81	CH81	K86
CH82	CH177	CH82	CH82	K90
CH83	CH178	CH83	CH83	K94
CH84	CH179	CH84	CH84	K0
CH85	CH180	CH85	CH85	K4
CH86	CH181	CH86	CH86	K8
CH87	CH182	CH87	CH87	K12
CH88	CH183	CH88	CH88	K17
CH89	CH184	CH89	CH89	K21
CH90	CH185	CH90	CH90	K25
CH91	CH186	CH91	CH91	K29
CH92	CH187	CH92	CH92	K33
CH93	CH188	CH93	CH93	K36
CH94	CH189	CH94	CH94	K41
CH190	CH193		CH95	K48
CH191	CH194		CH96	K49
CH192	CH195		CH97	K98

COM Relay	
 HVAB Relay	K99

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.

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Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI SCXI-1190

The NI SCXI-1190 is a <u>multiplexer</u> switch module for the SCXI platform designed to handle <u>RF signals</u> up to 1.3 GHz. The NI SCXI-1190 does not support routing signals to the <u>high-voltage analog bus</u>.

Operation Modes

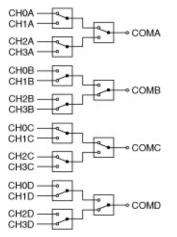
The following table lists the supported topology of the NI SCXI-1190 and possible <u>operation modes</u>.

Topology	Software Name	Immedia		
Quad 4×1	1190/Quad 4x1 Mux	~		
<u>Mux</u>	(NISWITCH_TOPOLOGY_1190_QUAD_4X1_MUX)			
Note The NILCOVI 1100 does not support individual relay control				

Note The NI SCXI-1190 does not support individual relay control.

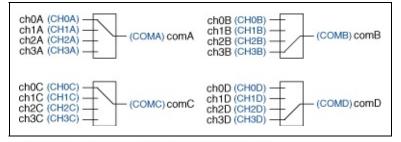
NI SCXI-1190 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1190.



NI SCXI-1190 Quad 4×1 Multiplexer Topology

The following figure represents the NI SCXI-1190 in the quad 4×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect ch1A to comA, call niSwitch_Connect (vi, "ch1A", "comA"). If you now want to connect ch2A to comA, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect (vi, "ch1A", "comA")
niSwitch_Connect (vi, "ch2A", "comA")
```



Note niSwitch_Disconnect (vi, "ch1A", "comA") does not activate the relay until the niSwitch_Connect(vi, "ch2A", "comA") is executed.
One channel of each 4×1 multiplexer is always connected to its respective common channel.

NI SCXI-1190 Relay Replacement

The NI SCXI-1190 uses electromechanical armature relays.

Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number	
Aromat (NAiS)	RG1ET-5V	

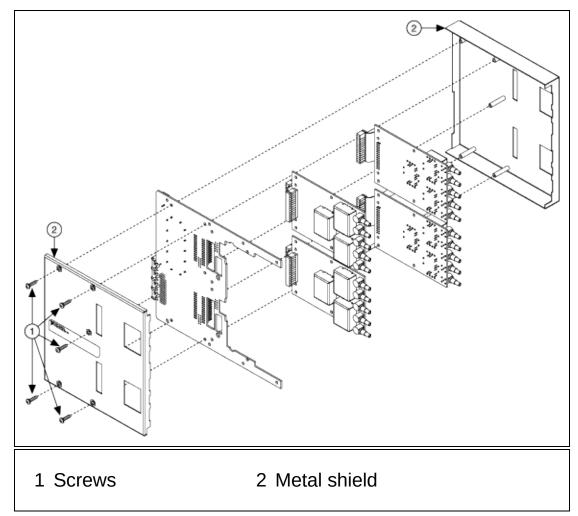
Complete the following sets of steps to disassemble your module and replace a failed relay.

Disassemble the Module

1. Ground yourself using a grounding strap or a ground connected to your SCXI chassis.

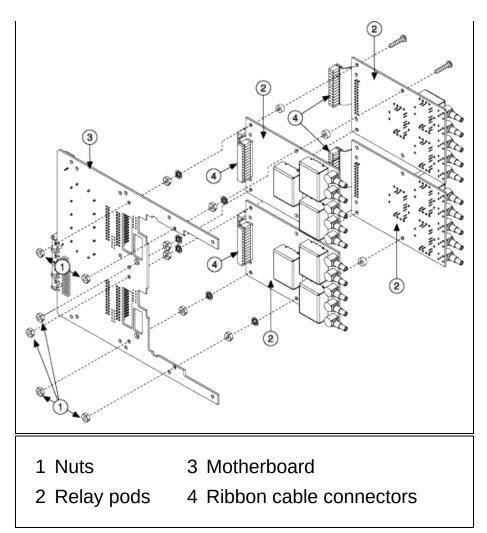


- **Note** Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the five screws that secure the metal shield.



3. Carefully remove the six nuts that secure the four relay pods to the motherboard.

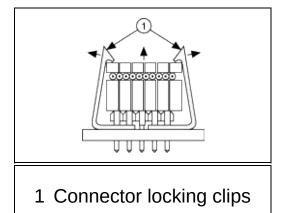




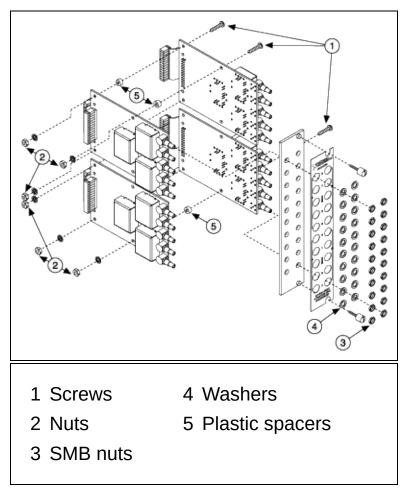
4. Disconnect the four ribbon cable connectors from the motherboard headers by carefully pulling apart the connector locking clips.



Caution Overextending the connector locking clips may cause them to break.



- 5. Separate the relay pods from the motherboard.
- 6. To separate an individual pod for relay replacement, remove the three screws as well as the SMB nuts and washers that secure the relay pod to the front panel. Retain the plastic spacers for reassembly.



7. To remove the shield and relay from the pod, refer to Replace the Relay.

Replace the Relay

Make sure you have the following:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.



Note Use a torque wrench set at 2 in-lb to secure the SMB nuts.

NI SCXI-1191

The NI SCXI-1191 is a <u>multiplexer</u> switch module for the SCXI platform designed to handle <u>RF signals</u> up to 4 GHz. The NI SCXI-1191 does not support routing signals to the <u>high-voltage analog bus</u>.

Operation Modes

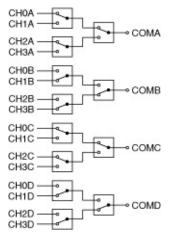
The following table lists the supported topology of the NI SCXI-1191 and possible <u>operation modes</u>.

Topology	Software Name	Immedia		
Quad 4×1	1191/Quad 4x1 Mux	~		
<u>Mux</u>	(NISWITCH_TOPOLOGY_1191_QUAD_4X1_MUX)			
Note The NILCOVI 1101 does not support individual relay control				

Note The NI SCXI-1191 does not support individual relay control.

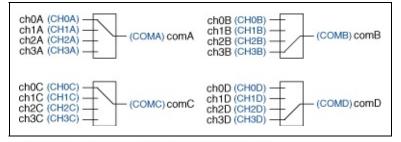
NI SCXI-1191 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1191.



NI SCXI-1191 Quad 4×1 Multiplexer Topology

The following figure represents the NI SCXI-1191 in the quad 4×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect ch1A to comA, call niSwitch_Connect (vi, "ch1A", "comA"). If you now want to connect ch2A to comA, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect (vi, "ch1A", "comA")
niSwitch_Connect (vi, "ch2A", "comA")
```



Note niSwitch_Disconnect (vi, "ch1A", "comA") does not activate the relay until the niSwitch_Connect(vi, "ch2A", "comA") is executed.
One channel of each 4×1 multiplexer is always connected to its respective common channel.

NI SCXI-1192

The NI SCXI-1192 is an 8-channel, <u>general-purpose</u> switch module for the SCXI platform designed to handle <u>RF signals</u> up to 18 GHz. The NI SCXI-1192 is composed of <u>8-SPDT</u> relays. The NI SCXI-1192 does not support routing signals to the <u>high-voltage analog bus (HVAB</u>).

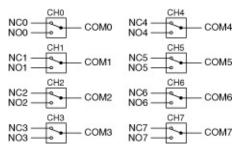
Operation Modes

The following table lists the supported topology of the NI SCXI-1192 and possible <u>operation modes</u>.

Topology	Software Name	Immediate	Scann
8-SPDT	1192/8-SPDT	~	
	(NISWITCH_TOPOLOGY_1192_8_SPDT)		

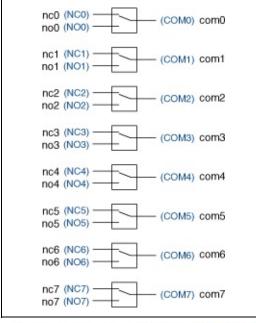
NI SCXI-1192 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1192.



NI SCXI-1192 8-SPDT Topology

The following figure represents the NI SCXI-1192 in the 8-SPDT generalpurpose topology.



Legend: Software Name (Hardware Name)

Making a Connection

You can control the channels using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect the NO terminal of channel 2 to the COM terminal of channel 2, and to disconnect the NC terminal of channel 2 from the COM terminal, call niSwitch_Connect(vi, "NO2", "COM2"). If you now want to connect NC2 to com2, you need to first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect(vi, "NO2", "COM2")
```

```
niSwitch_Connect(vi, "NC2", "COM2")
```



Note niSwitch_Disconnect(vi, "NO2", "COM2") does not activate the relay until niSwitch_Connect(vi, "NC2", "COM2") is executed.

NI SCXI-1193

The NI SCXI-1193 is a high-density <u>multiplexer</u> switch module for SCXI designed to carry <u>RF signals</u> up to 500 MHz. The NI SCXI-1193 does not support routing signals to the <u>high-voltage analog bus</u>.

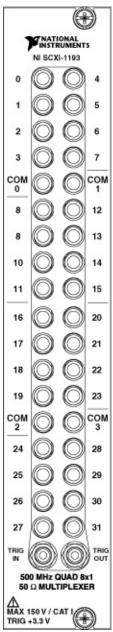
Operation Modes

The following table lists the supported topologies of the NI SCXI-1193 and possible <u>operation modes</u>.

Topology	Software Name
<u>Quad 8×1</u> <u>Multiplexer</u>	1193/Quad 8x1 Mux (NISWITCH_TOPOLOGY_1193_QUAD_8X1_MUX)
<u>Quad 4×1</u> <u>Terminated</u> <u>Multiplexer</u>	1193/Quad 4x1 Terminated Mux (NISWITCH_TOPOLOGY_1193_QUAD_4X1_TERMINATEI
<u>Dual 16×1</u> <u>Multiplexer</u>	1193/Dual 16x1 Mux (NISWITCH_TOPOLOGY_1193_DUAL_16X1_MUX)
<u>Dual 8×1</u> <u>Terminated</u> <u>Multiplexer</u>	1193/Dual 8x1 Terminated Mux (NISWITCH_TOPOLOGY_1193_DUAL_8X1_TERMINATED
<u>32×1</u> Multiplexer	1193/32x1 Mux (NISWITCH_TOPOLOGY_1193_32X1_MUX)
<u>16×1</u> <u>Terminated</u> <u>Multiplexer</u>	1193/16x1 Terminated Mux (NISWITCH_TOPOLOGY_1193_16X1_TERMINATED_MU)
Independent	1193/Independent (NISWITCH_TOPOLOGY_1193_INDEPENDENT)

NI SCXI-1193 Front Panel

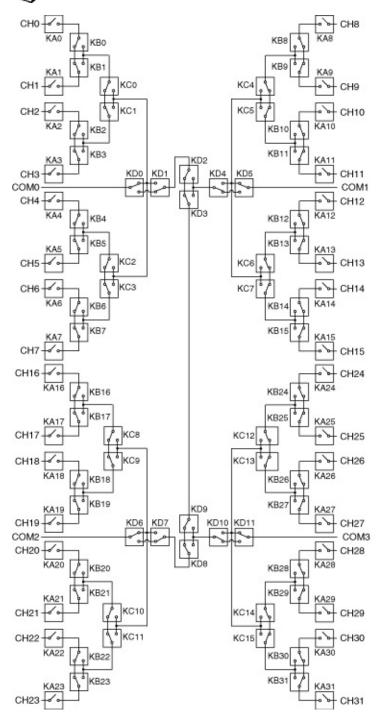
The following figure illustrates the NI SCXI-1193 front panel.



NI SCXI-1193 Hardware Diagram

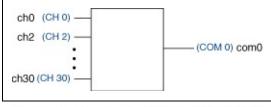
The following figure shows the hardware diagram for the NI SCXI-1193.

Note Relay names are the same for every topology.



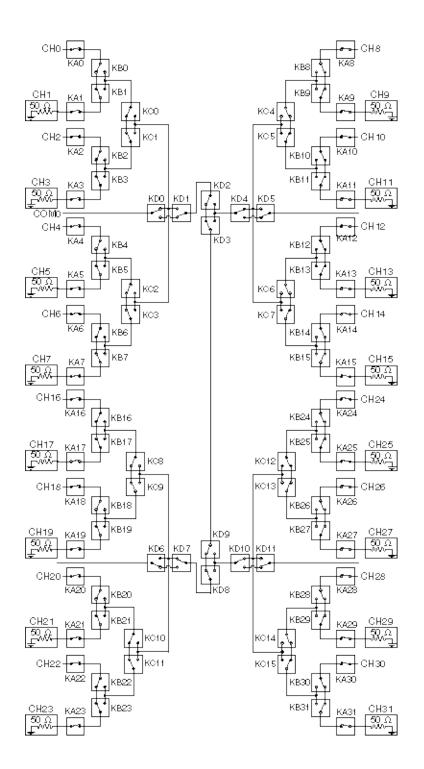
NI SCXI-1193 16×1 Terminated Multiplexer Topology

The following figure represents the NI SCXI-1193 16×1 terminated <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI SCXI-1193 in the 16×1 terminated <u>multiplexer</u> topology.



For proper termination, connect an external terminator, such as the NI 50 Ω MCX terminator (778831-01), to every odd channel. Any input connected to an even channel not connected to the COM is automatically routed to its associated termination channel.

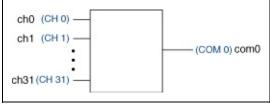
The NI SCXI-1193 in this topology contains 16 input channels connected to a common channel. These input channels are the even channels from channel 0 to channel 30. The common channel is referred to as com0. You can connect any even input channel to com0 in this topology.

You can connect the channels of the NI SCXI-1193 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com0.

When scanning the NI SCXI-1193, a typical scan list entry could be ch_{2-} >com0;. This entry disconnects ch2 from its termination and routes it to com0.

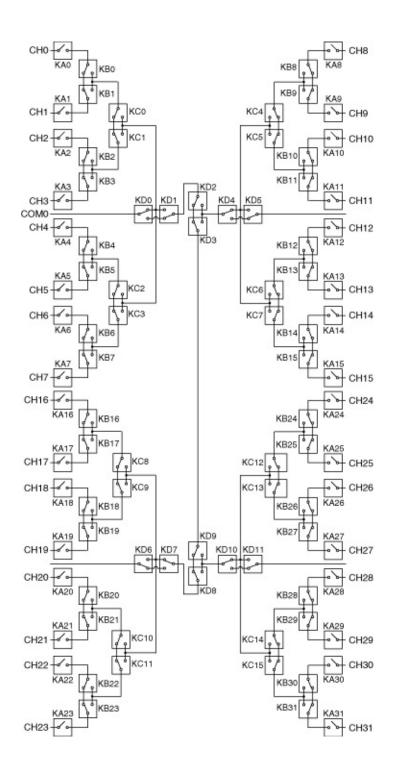
NI SCXI-1193 32×1 Multiplexer Topology

The following figure represents the NI SCXI-1193 32×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI SCXI-1193 in the 32×1 multiplexer topology.



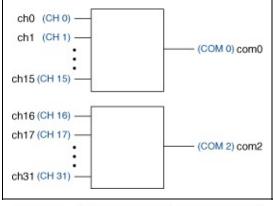
The NI SCXI-1193 in this topology contains 32 input channels connected to a common channel. These input channels are referred to as ch<0..31> and the common channel is referred to as com0. You can connect any channel to com0 in this topology.

You can connect the channels of the NI SCXI-1193 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com0.

When <u>scanning</u> the NI SCXI-1193, a typical scan list entry could be ch2->com0;. This entry routes the signal from ch2 to com0.

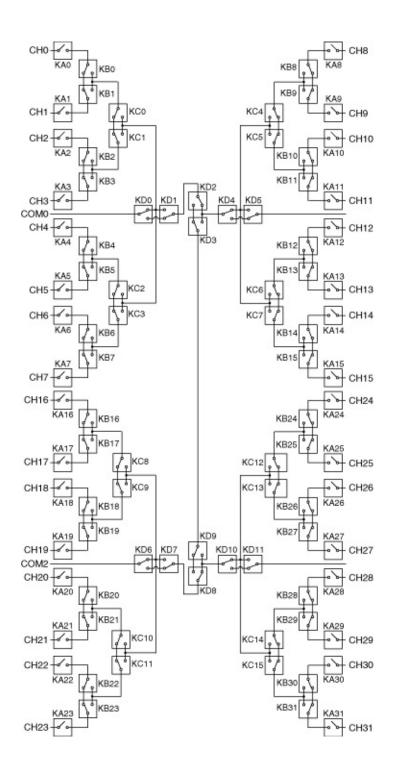
NI SCXI-1193 Dual 16×1 Multiplexer Topology

The following figure represents the NI SCXI-1193 dual 16×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI SCXI-1193 in the dual 16×1 multiplexer topology.



The NI SCXI-1193 in this topology contains two banks of 16 input channels connected to a common channel. These input channels are referred to as ch<0..31>, and the two common channels are referred to as com0 and com2. You can only connect to the common channel that is in the same bank. The banks are organized as such:

Input Channels	Common Channel
ch0, ch1, ch2, ch3, ch4, ch5, ch6, ch7, ch8, ch9, ch10, ch11, ch12, ch13, ch14, ch15	com0
ch16, ch17, ch18, ch19, ch20, ch21, ch22, ch23, ch24, ch25, ch26, ch27, ch28, ch29, ch30, ch31	com2

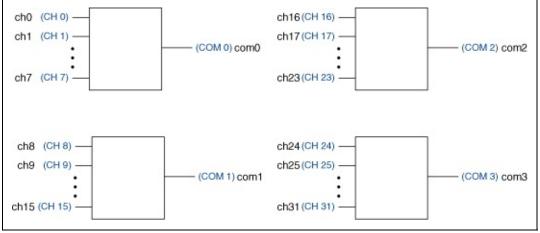
For example, you can connect ch8 to com0; however, you cannot connect ch8 to com2 in this topology.

You can connect the channels of the NI SCXI-1193 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 2, call the niSwitch Connect Channels VI or the niSwitch_Connect function, with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com2.

When <u>scanning</u> the NI SCXI-1193, a typical scan list entry could be ch2->com0;. This entry routes the signal from ch2 to com0.

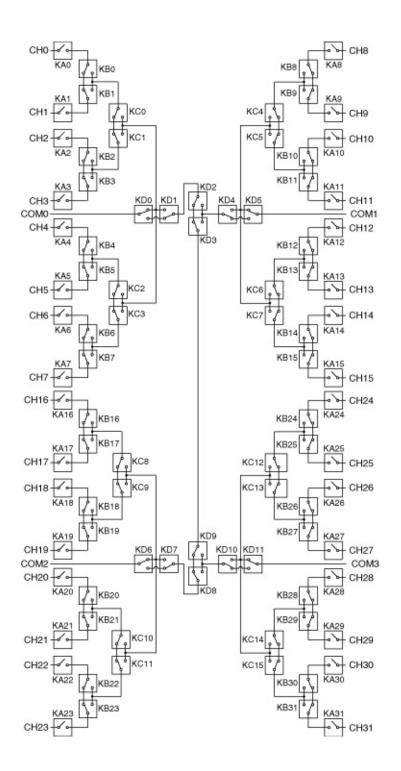
NI SCXI-1193 Quad 8×1 Multiplexer Topology

The following figure represents the NI SCXI-1193 quad 8×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI SCXI-1193 in the quad 8×1 multiplexer topology. The reset position is the power-on configuration of the module.



The NI SCXI-1193 in this topology contains four banks of eight input channels connected to a common channel. These input channels are referred to as ch<0..31>, and the four common channels are referred to as com<0..3>. You can only connect to the common channel that is in the same bank. The banks are organized as follows:

Input Channels	Common Channel
ch0, ch1, ch2, ch3, ch4, ch5, ch6, ch7	com0
ch8, ch9, ch10, ch11, ch12, ch13, ch14, ch15	com1
ch16, ch17, ch18, ch19, ch20, ch21, ch22, ch23	com2
ch24, ch25, ch26, ch27, ch28, ch29, ch30, ch31	com3

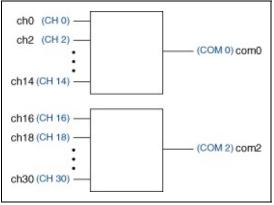
For example, you can connect ch8 to com1; however, you cannot connect ch8 to com0 in this topology.

You can connect the channels of the NI SCXI-1193 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 2, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com2.

When <u>scanning</u> the NI SCXI-1193, a typical scan list entry could be ch2->com0;. This entry routes the signal from ch2 to com0.

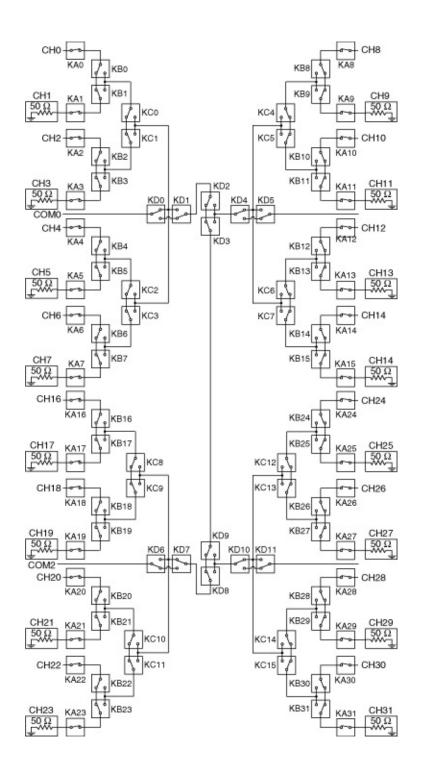
NI SCXI-1193 Dual 8×1 Terminated Multiplexer Topology

The following figure represents the NI SCXI-1193 dual 8×1 terminated <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI SCXI-1193 in the dual 8×1 terminated <u>multiplexer</u> topology.



For proper termination, connect an external terminator, such as the NI 50 Ω MCX terminator (778831-01), to every odd channel. Any input connected to an even channel not connected to the COM is automatically routed to its associated termination channel.

The NI SCXI-1193 in this topology contains two banks of eight input channels connected to a common channel. These input channels are the even channels from channel 0 to channel 30. The two common channels are referred to as com0 and com2. You can only connect to the common channel that is in the same bank. The banks are organized as such:

Input Channels	Common Channel
ch0, ch2, ch4, ch6, ch8, ch10, ch12, ch14	com0
ch16, ch18, ch20, ch22, ch24, ch26, ch28, ch30	com2

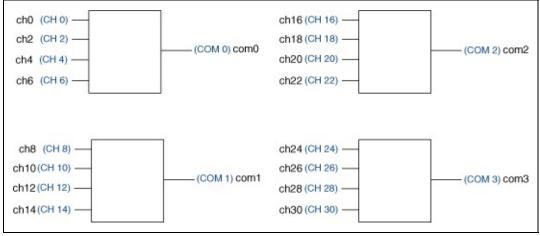
For example, you can connect ch8 to com0; however, you cannot connect ch8 to com2 in this topology.

You can connect the channels of the NI SCXI-1193 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 2, call the niSwitch Connect Channels VI or the niSwitch_Connect function, with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com2.

When scanning the NI SCXI-1193, a typical scan list entry could be ch_{2-} >com0;. This entry disconnects ch_{2} from its termination and routes it to com0.

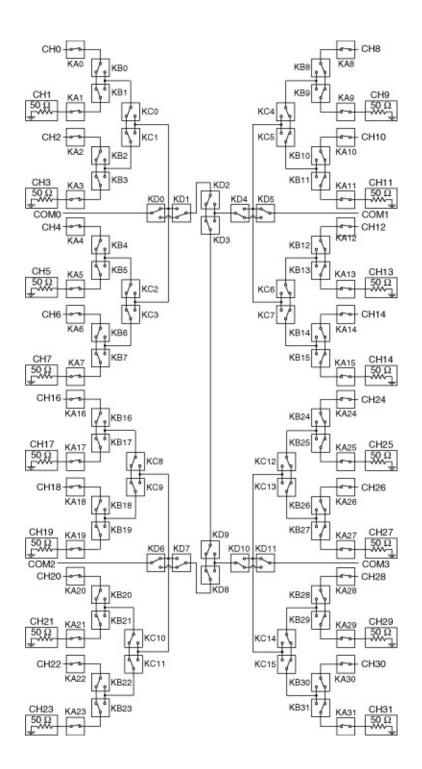
NI SCXI-1193 Quad 4×1 Terminated Multiplexer Topology

The following figure represents the NI SCXI-1193 quad 4×1 terminated <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

The following figure shows the reset position of the NI SCXI-1193 in the quad 4×1 terminated <u>multiplexer</u> topology.



For proper termination, connect an external terminator, such as the NI 50 Ω MCX terminator (778831-01), to every odd channel. Any input connected to an even channel not connected to the COM is automatically routed to its associated termination channel.

The NI SCXI-1193 in this topology contains four banks of four input channels connected to a common channel. These input channels are the even channels from channel 0 to channel 30. The four common channels are referred to as com<0..3>. You can only connect to the common channel that is in the same bank. The banks are organized as follows:

Input Channels	Common Channel
ch0, ch2, ch4, ch6	com0
ch8, ch10, ch12, ch14	com1
ch16, ch18, ch20, ch22	com2
ch24, ch26, ch28, ch30	com3

For example, you can connect ch8 to com1; however, you cannot connect ch8 to com0 in this topology.

You can connect the channels of the NI SCXI-1193 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 16 to common 2, call the niSwitch Connect Channels VI or the niSwitch_Connect function with the **channel 1** parameter set to ch16 and the **channel 2** parameter set to com2.

When scanning the NI SCXI-1193, a typical scan list entry could be ch_{2-} >com0;. This entry disconnects ch_{2} from its termination and routes it to com0.

NI SCXI-1193 Independent Topology

The independent topology allows the NI SCXI-1193 to utilize its full routing capabilities. Possible configurations include <u>3×1 multiplexers</u> and <u>dimensionally flexible sparse matrices</u>.

Control the individual relays with the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function (refer to the NI SCXI-1193 <u>hardware</u> <u>diagram</u> for relay names). For example, to connect CH2 to COM0 on the NI SCXI-1193, call the niSwitch Relay Control VI or the niSwitch_RelayControl function with the **action name** parameter set to close and the **relay name** parameter set to KA0. Repeat the call to the niSwitch Relay Control VI or the niSwitch_RelayControl function to close KB1 then KC0.

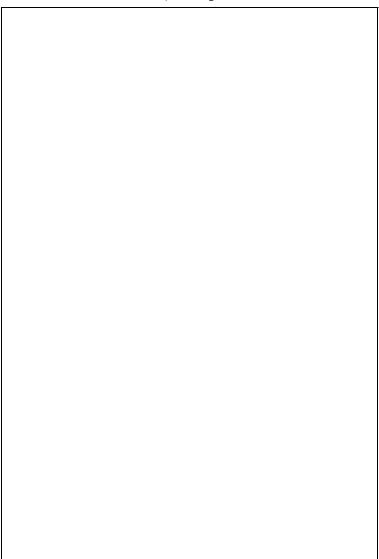
When <u>scanning</u> the NI SCXI-1193, use the channel names in the <u>scan</u> <u>list</u>. A typical scan list entry could be ch2->com0;. This entry routes the signal connected to CH2 to COM0.

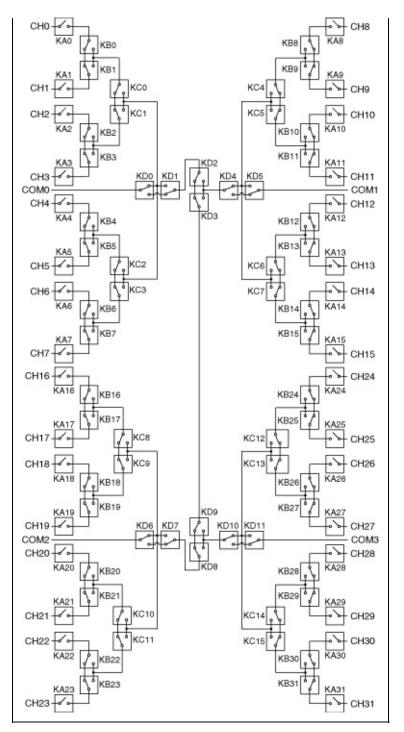
Valid Internal Channels

To determine the internal channel names, combine the names of all relays adjacent to a channel, in alphabetical order, and remove the K's. For example, in C, the channel connecting KA0 and KB0 is called A0B0.

For example, to connect CH0 to COM0 using internal channel names, call the following:

niSwitch_Connect (exampleSession, ch0, a0b0); niSwitch_Connect (exampleSession, a0b0, b0b1c0); niSwitch_Connect (exampleSession, b0b1c0, c0c1c2c3d0d1); niSwitch_Connect (exampleSession, c0c1c2c3d0d1, com0);





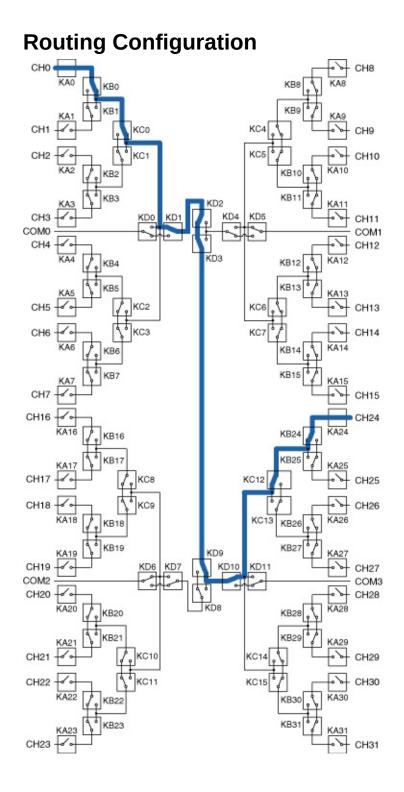
The following is a list of the valid internal channel names:

a0b0	a16b16	b0b1	b24b25	c0c1	ch4	ch2
a1b1	a17b17	b0b1c0	b24b25c12	c0c1c2c3d0d1	ch5	ch2
a2b2	a18b18	b10b11	b26b27	c10c11	ch6	ch2
a3b3	a19b19	b10b11c5	b26b27c13	c12c13	ch7	ch2

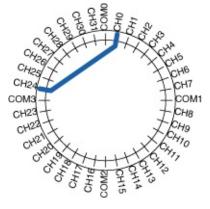
a4b4	a20b20	b12b13	b28b29	c12c13c14c15d10d11	ch8	ch2
a5b5	a21b21	b12b13c6	b28b29c14	c14c15	ch9	ch2
a6b6	a22b22	b14b15	b2b3	c2c3	ch10	ch2
a7b7	a23b23	b14b15c7	b2b3c1	c4c5	ch11	ch2
a8b8	a24b24	b16b17	b30b31	c4c5c6c7d4d5	ch12	ch2
a9b9	a25b25	b16b17c8	b30b31c15	c6c7	ch13	ch2
a10b10	a26b26	b18b19	b4b5	c8c9	ch14	ch3
a11b11	a27b27	b18b19c9	b4b5c2	c8c9c10c11d6d7	ch15	ch3
a12b12	a28b28	b20b21	b6b7	ch0	ch16	corr
a13b13	a29b29	b20b21c10	b6b7c3	ch1	ch17	corr
a14b14	a30b30	b22b23	b8b9	ch2	ch18	corr
a15b15	a31b31	b22b23c11	b8b9c4	ch3	ch19	corr

Dimensionally Flexible Sparse Matrix

The NI SCXI-1193 architecture allows signals to be routed between any pair of channels or commons while maintaining >500 MHz bandwidth and minimizing RF stubs and reflections. The architecture provides more flexibility than traditional sparse matrices because the shape of the matrix is user-defined and there is no restriction on row-to-row or column-to-column connections. For additional information about dimensionally flexible sparse matrices, refer to the NI Developer Zone document, *Advanced Signal Routing with the NI PXI-2593 and NI SCXI-1193 RF Switches* at ni.com/zone.



Equivalent Representation



NI SCXI-1193 Reset Algorithms

The NI SCXI-1193 uses coupled <u>SPDT</u> relays to provide flexible routing and multiple configurations. This architecture allows the commons of each bank to be connected for further signal routing options. If two or more signal generators are connected to the commons (COM<0..3>), avoid connecting the output terminals, as this could damage the signal generators. Consult your signal source documentation for more information.

Two reset algorithms are used to reduce the chances of inadvertently connecting channels or commons during software resets, disconnecting all channels, changing topologies, or aborting scans. These algorithms are provided in the following sections as a reference.



Note During chassis power on, the NI SCXI-1193 opens all relays, returning to the <u>quad 8x1 multiplexer</u> topology. In this scenario, neither of the following algorithms are used.

In the following algorithms, OPEN refers to the power-on state of the relay as represented in the <u>quad 8x1 multiplexer</u> topology. RESET refers to the final state of the relay after the algorithm completes.

Simple Reset Algorithm

The simple reset algorithm restores the switch to its initial state after aborting a scan and during a call to <u>niSwitch_DisconnectAll</u>. This algorithm is not used in the independent topology.

- 1. Open all KA relays to disconnect any signals at the channel terminals.
- 2. Wait for relay settling time.
- 3. Actuate all other relays as necessary. The simple algorithm is never used when changing topologies. Therefore, KD relays will not actuate in a way that can short the COMs.
- 4. Wait for relay settling time.
- 5. Reset KA relays as necessary
- 6. Wait for relay settling time.

Advanced Reset Algorithm

The advanced reset algorithm is used with all topologies for software reset, and for changing between topologies. This algorithm is used for disconnecting all channels and is also used after aborting a scan to restore the switch to its initial state in the independent topology.

- 1. Open all KA relays to disconnect any signals at the channel terminals.
- 2. Wait for relay settling time.
- 3. Reset all KB relays.
- 4. Reset all KC relays.
- 5. Ensure that both relays in each of the following relay pairs are OPEN or CLOSED. To determine their state, use niSwitch Query a Single Switch. If the relays in each pair are mismatched, actuate one of the relays.
 - KD0, KD1
 - KD4, KD5
 - KD6, KD7
 - KD10, KD11
- 6. Wait for relay settling time.
- If KD0, KD1, KD4, KD5, KD6, KD7, KD10, and KD11 are not in their respective reset positions, continue to the next step. Otherwise, reset KD2, KD3, KD8, KD9, and skip to step 18.
- 8. Set KD2 and KD8 to OPEN.
- 9. Set KD3 and KD9 to their reset position.
- 10. Wait for relay settling time.
- 11. Set KD0, KD1, KD4, KD5 to their reset position.
- 12. Wait for relay settling time.
- 13. Set KD6, KD7, KD10, KD11 to their reset position.
- 14. Wait for relay settling time.
- 15. Set KD2 and KD8 to their reset position.
- 16. Wait for relay settling time.
- 17. Reset KA relays as necessary
- 18. Wait for relay settling time.

NI SCXI-1193 Triggering

Trigger Input

The following table lists valid trigger inputs for the NI SCXI-1193.

Trigger Input	Software	Hard
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI trigge line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI trigge line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI trigge line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI trigge line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI trigge line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI trigge line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI trigge line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI trigge line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A

Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRI on fi
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin AUX conr of a SCX back ada
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	From pane term bloc the mod Slot
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	From pane term bloc the mod Slot
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	From pane term bloc the mod Slot
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	From pane term bloc the mod

		Slot
Front Connector Module 5	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Fron pane term block the mode Slot
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Fron pane term block the mode Slot
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Fron pane term block the mode Slot
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Fron pane term block the mode Slot
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Fron pane term block the mode Slot
Front	Front Connector Module 10	Fron

Connector Module 10	(NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	pan tern bloc the moc Slot
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Fro pan tern bloc the moo Slot
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Fro pan tern bloc the moo Slot
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin AU2 con of a SC2 bac ada con to tl mod Slot
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin AUX con of a SCX bac

		adap conn to the modu Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 AUX conn of an SCX back adap conn to the Modu Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 AUX conn of an SCX back adap conn to the Modu
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 6 AUX conn of an SCX back adap conn to the Modu

Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 6 AUX I conne of an SCXI backp adapt conne to the modu Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 AUX I conne of an SCXI backp adapt conne to the modu Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 AUX I conne of an SCXI backp adapt conne to the modu Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 AUX I conne of an SCXI

		backp adapt conne to the modu Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 AUX I conne of an SCXI backp adapt conne to the modu Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 AUX I conne of an SCXI backp adapt conne to the modu Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 6 AUX I conne of an SCXI backp adapt conne to the modu

Scan Advanced Output

The following table lists valid scan advanced outputs for the NI SCXI-1193.

Scan Advanced Output	Software	Hard
None	None (NISWITCH_VAL_NONE)	N/A
TTLO	TTL0 (NISWITCH_VAL_TTL0)	SCXI trigge 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI trigge 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI trigge 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI trigge 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI trigge 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI trigge 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI trigge 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI trigge 7
Front Connector	Front Connector (NISWITCH_VAL_FRONTCONNECTOR)	TRIG on fro

		panel
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 AUX conne of an backr adapt
Front Connector Module 1	Front Connector Module 1 (NISWITCH_VAL_FRONTCONNECTOR_MODULE1)	Front panel termir block the modu Slot 1
Front Connector Module 2	Front Connector Module 2 (NISWITCH_VAL_FRONTCONNECTOR_MODULE2)	Front panel termir block the modu Slot 2
Front Connector Module 3	Front Connector Module 3 (NISWITCH_VAL_FRONTCONNECTOR_MODULE3)	Front panel termir block the modu Slot 3
Front Connector Module 4	Front Connector Module 4 (NISWITCH_VAL_FRONTCONNECTOR_MODULE4)	Front panel termir block the modu Slot 4
Front Connector	Front Connector Module 5 (NISWITCH_VAL_FRONTCONNECTOR_MODULE5)	Front panel

Module 5		termi block the modu Slot S
Front Connector Module 6	Front Connector Module 6 (NISWITCH_VAL_FRONTCONNECTOR_MODULE6)	Front pane termi block the modu Slot 6
Front Connector Module 7	Front Connector Module 7 (NISWITCH_VAL_FRONTCONNECTOR_MODULE7)	Front pane termi block the modu Slot 7
Front Connector Module 8	Front Connector Module 8 (NISWITCH_VAL_FRONTCONNECTOR_MODULE8)	Front pane termi block the modu Slot 8
Front Connector Module 9	Front Connector Module 9 (NISWITCH_VAL_FRONTCONNECTOR_MODULE9)	Front pane termi block the modu Slot 9
Front Connector Module 10	Front Connector Module 10 (NISWITCH_VAL_FRONTCONNECTOR_MODULE10)	Front pane termi block

		the mo Slo
Front Connector Module 11	Front Connector Module 11 (NISWITCH_VAL_FRONTCONNECTOR_MODULE11)	Fro pa ter blo the Mo Slo
Front Connector Module 12	Front Connector Module 12 (NISWITCH_VAL_FRONTCONNECTOR_MODULE12)	Fro pa ter blo the mo Slo
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin AL co of ba ad co to mo Slo
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin CO of ba ad CO to SIG

Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 9 AUX conne of an backp adapt conne to the modu Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 9 AUX conne of an backp adapt conne to the modu Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 9 AUX conne of an backp adapt conne to the modu Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 9 AUX conne of an backp adapt conne to the

		mod Slot
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 9 AUX conn of an back adap conn to the Slot
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 9 AUX conn of an back adap conn to the Mode Slot 9
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 AUX conn of an back adap conn to the mode Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 9 AUX conn of an back

		adapt conne to the modu Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 9 AUX conne of an backr adapt conne to the modu Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 9 AUX conne of an backr adapt conne to the modu Slot 1

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

NI SCXI-1193 Relay Replacement

The NI SCXI-1193 uses electromechanical armature relays.

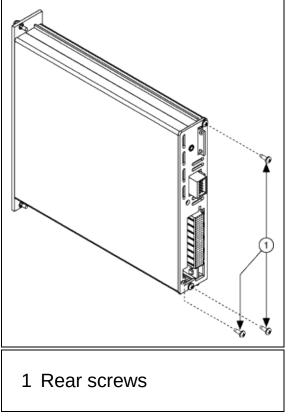
Refer to the following table for information about ordering replacement relays.

Relay Manufacturer	Part Number	
Aromat (NAiS)	AGQ210A4H	

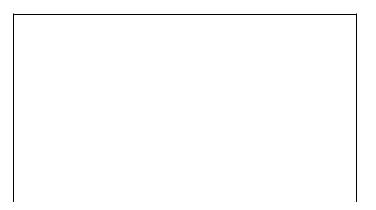
Complete the following sets of steps to disassemble your module, replace a failed relay, and reassemble your module.

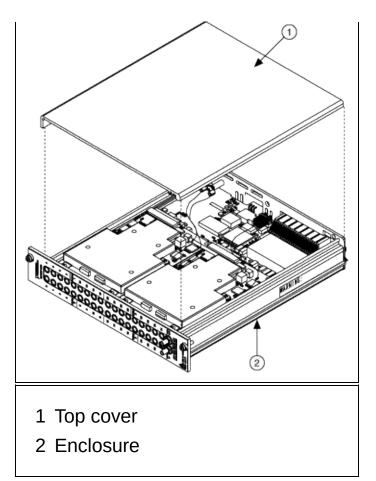
Disassemble the Module

- 1. Ground yourself using a grounding strap or a ground connected to your SCXI Chassis.
 - Note Properly grounding yourself prevents damage to your module from electrostatic discharge.
- 2. Remove the three screws from the back of the module.

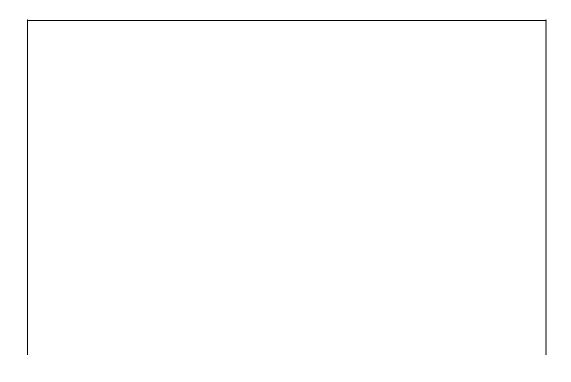


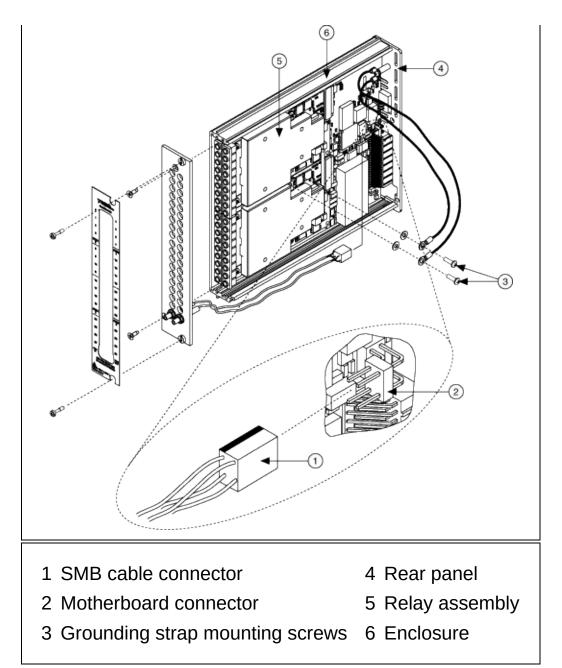
3. Carefully remove the top cover of the module using a flathead screwdriver.



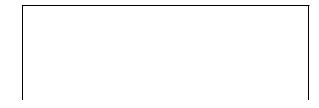


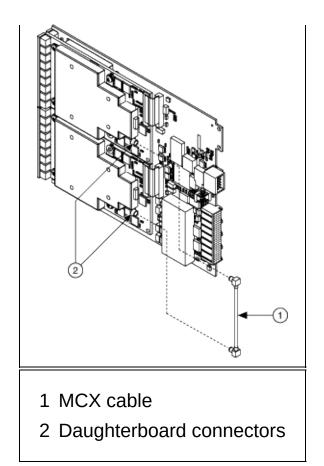
4. Disconnect the SMB cable connector from the motherboard connector.



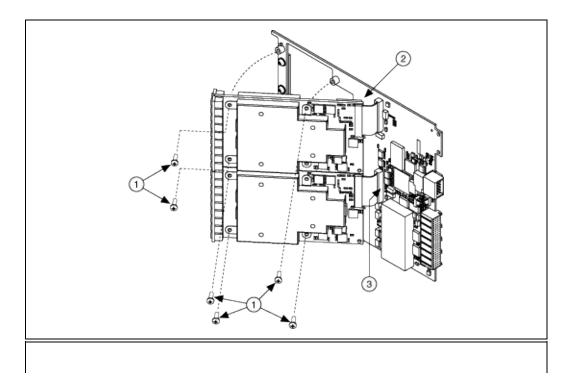


- 5. Remove the ground strap mounting screws.
- 6. Remove the rear panel.
- 7. Slide the relay assembly out of the enclosure.
- 8. Remove the MCX cable between the daughterboard connectors.

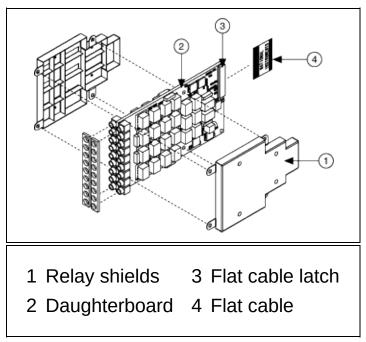




9. Remove the six screws holding the daughterboard to the CMI bracket.

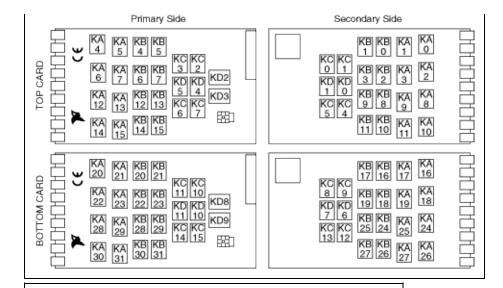


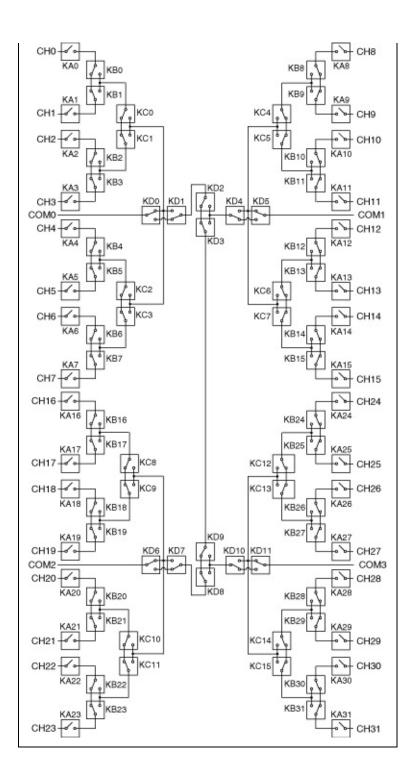
- 1 Daughterboard screws
- 3 Motherboard connector
- 2 Daughterboard connectors
- 10. Lift the flexible flat cable latch on the motherboard connector and remove the daughterboard.
- 11. Remove the shields from the daughterboard.



- 12. Lift the flat cable latch on the daughterboard and pull out the flat cable.
- 13. Locate the relay you want to replace. Refer to the following figures for relay locations.







Replace the Relay

Before you begin, make sure you have the following items:

- Temperature-regulated soldering iron set to 300 °C
- 60/40 Lead/Tin solder (flux core)
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

If you have a surface mount rework station, replace the relay as you would any other surface mount part. Otherwise, complete the following steps to replace the relay:

- 1. Use the soldering iron and solder wick to remove as much solder from the relay pads as possible. Do not leave the soldering iron on any lead for more than 5 seconds.
 - Note If it is necessary to reapply the soldering iron to the pad, allow the connection to cool completely before reapplying the soldering iron.
- 2. Apply heat to the pads one at a time, and use the pick to gently pry the relay pins from the pads. Make sure that the solder is molten before prying.
 - **Caution** Using excessive force on a soldered pad can result in lifting the PCB trace and ruining the daughterboard.
- 3. Remove the relay.
- 4. Clean the pads with isopropyl alcohol and cotton swabs.
- 5. Place the new relay on the PCB pads and solder.
- 6. Remove the excess flux with isopropyl alcohol and cotton swabs.



Caution Do *not* use flux remover to clean the board after relay replacement.

Reassemble the Module

Complete the <u>Disassemble the Module</u> steps in reverse order to reassemble your module.



Tip In NI-SWITCH 3.1 or later, you can use the Switch Soft Front panel to <u>reset the relay count</u> after you have replaced a failed relay.

NI SCXI-1194/1195

The NI SCXI-1194 and the NI SCXI-1195 are <u>multiplexer</u> switch modules for the SCXI platform designed to handle <u>RF signals</u> up to 2.5 GHz (NI SCXI-1194) and 5 GHz (NI SCXI-1195). The NI SCXI-1194/1195 does not support routing signals to the <u>high-voltage analog bus</u>.

NI SCXI-1194 Operation Modes

The following table lists the supported <u>topology</u> of the NI SCXI-1194 and possible <u>operation modes</u>.

Topology	Software Name	Immedia
Quad 4×1	1194/Quad 4x1 Mux	~
Mux	(NISWITCH_TOPOLOGY_1194_QUAD_4X1_MUX)	

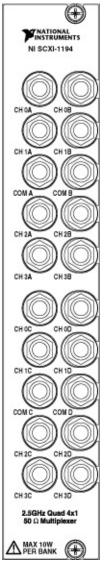
NI SCXI-1195 Operation Modes

The following table lists the supported <u>topology</u> of the NI SCXI-1195 and possible <u>operation modes</u>.

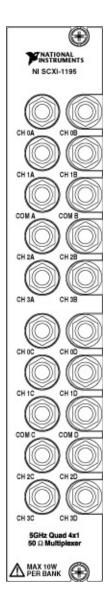
Topology	Software Name	Immedia
Quad 4×1	1195/Quad 4x1 Mux	~
Mux	(NISWITCH_TOPOLOGY_1195_QUAD_4X1_MUX)	

NI SCXI-1194/1195 Front Panels

The following figure illustrates the NI SCXI-1194 front panel.

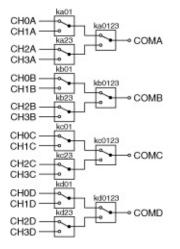


The following figure illustrates the NI SCXI-1195 front panel.



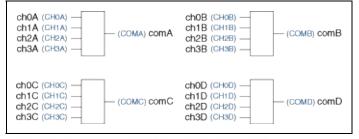
NI SCXI-1194/1195 Hardware Diagram

The following figure shows the hardware diagram for the NI SCXI-1194.



NI SCXI-1194/1195 Quad 4×1 Multiplexer Topology

The following figure represents the NI SCXI-1194/1195 in the quad 4×1 <u>multiplexer</u> topology.



Legend: Software Name (Hardware Name)

Making a Connection

In this topology, you can connect channels by calling the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.

For example, to connect ch1A to comA, call niSwitch_Connect (vi, "ch1A", "comA"). If you now want to connect ch2A to comA, first disconnect the existing connection. The sequence of calls for this task is as follows:

```
niSwitch_Disconnect (vi, "ch1A", "comA")
niSwitch_Connect (vi, "ch2A", "comA")
```



Note niSwitch_Disconnect (vi, "ch1A", "comA") does not operate the relay until the niSwitch_Connect(vi, "ch2A", "comA") is executed. One channel of each 4×1 multiplexer is always connected to its respective common channel.

Note For an initial connection, you do not need to disconnect the default channel (ch0) from COM after the module has been reset or a call to the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch DisconnectAll</u> function has been made.

When <u>scanning</u> the NI SCXI-1194/1195, a typical scan list entry could be ch1A->comA;. This entry routes the signal from ch1A to comA.

NI SCXI-1194/1195 Triggering

Trigger Input

The following table shows valid trigger inputs for the NI SCXI-1194/1195.

Trigger Input	Software	Harı
Immediate	Immediate (NISWITCH_VAL_IMMEDIATE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI tr line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI tr line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI tr line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI tr line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI tr line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI tr line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI tr line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI tr line 7
Software Trigger	niSwitch Send Software Trigger VI or niSwitch_SendSoftwareTrigger function	N/A
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 6 o adapte SCXI- 1357/1:
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 6 ol adaptel SCXI- 1357/1:

		connect the mo Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 6 c adapte SCXI- 1357/1 connec the mo Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 6 c adapte SCXI- 1357/1 connec the mo

		Slot 6
Rear Connector Module 7	Rear Connector Module 7 (NISWITCH_VAL_REARCONNECTOR_MODULE7)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 10
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 6 c adapte SCXI- 1357/1 connec the mc Slot 11
Rear	Rear Connector Module 12	Pin 6 d

Connector	(NISWITCH_VAL_REARCONNECTOR_MODULE12)	adapteı
Module 12		SCXI-
		1357/1;
		connec
		the mod
		Slot 12

Scan Advanced Output

The following table shows valid scan advanced outputs for the NI SCXI-1194/1195.

Scan Advanced Output	Software	Har
None	None (NISWITCH_VAL_NONE)	N/A
TTL0	TTL0 (NISWITCH_VAL_TTL0)	SCXI tr line 0
TTL1	TTL1 (NISWITCH_VAL_TTL1)	SCXI tr line 1
TTL2	TTL2 (NISWITCH_VAL_TTL2)	SCXI tr line 2
TTL3	TTL3 (NISWITCH_VAL_TTL3)	SCXI tr line 3
TTL4	TTL4 (NISWITCH_VAL_TTL4)	SCXI tr line 4
TTL5	TTL5 (NISWITCH_VAL_TTL5)	SCXI tr line 5
TTL6	TTL6 (NISWITCH_VAL_TTL6)	SCXI tr line 6
TTL7	TTL7 (NISWITCH_VAL_TTL7)	SCXI tr line 7
Rear Connector	Rear Connector (NISWITCH_VAL_REARCONNECTOR)	Pin 9 o adapte SCXI- 1357/1
Rear Connector Module 1	Rear Connector Module 1 (NISWITCH_VAL_REARCONNECTOR_MODULE1)	Pin 9 o adapte SCXI- 1357/1 connec the mo

		Slot 1
Rear Connector Module 2	Rear Connector Module 2 (NISWITCH_VAL_REARCONNECTOR_MODULE2)	Pin 9 adapte SCXI- 1357/ conne the me Slot 2
Rear Connector Module 3	Rear Connector Module 3 (NISWITCH_VAL_REARCONNECTOR_MODULE3)	Pin 9 adapte SCXI- 1357/ conne the me Slot 3
Rear Connector Module 4	Rear Connector Module 4 (NISWITCH_VAL_REARCONNECTOR_MODULE4)	Pin 9 adapt SCXI- 1357/ conne the m Slot 4
Rear Connector Module 5	Rear Connector Module 5 (NISWITCH_VAL_REARCONNECTOR_MODULE5)	Pin 9 adapt SCXI- 1357/ conne the m Slot 5
Rear Connector Module 6	Rear Connector Module 6 (NISWITCH_VAL_REARCONNECTOR_MODULE6)	Pin 9 adapt SCXI- 1357/ conne the m Slot 6
Rear	Rear Connector Module 7	Pin 9

Connector Module 7	(NISWITCH_VAL_REARCONNECTOR_MODULE7)	adapt SCXI- 1357/ conne the m Slot 7
Rear Connector Module 8	Rear Connector Module 8 (NISWITCH_VAL_REARCONNECTOR_MODULE8)	Pin 9 adapt SCXI- 1357/ conne the m Slot 8
Rear Connector Module 9	Rear Connector Module 9 (NISWITCH_VAL_REARCONNECTOR_MODULE9)	Pin 9 adapt SCXI- 1357/ conne the m Slot 9
Rear Connector Module 10	Rear Connector Module 10 (NISWITCH_VAL_REARCONNECTOR_MODULE10)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 11	Rear Connector Module 11 (NISWITCH_VAL_REARCONNECTOR_MODULE11)	Pin 9 adapt SCXI- 1357/ conne the m Slot 1
Rear Connector Module 12	Rear Connector Module 12 (NISWITCH_VAL_REARCONNECTOR_MODULE12)	Pin 9 adapt SCXI-

		1357/1
		connec
		the mo
		Slot 12

Refer to the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch_ConfigureScanTrigger</u> function for descriptions and values of the trigger inputs and scan advanced outputs.

Integration and System Considerations

Expand this book for information related to integrating NI switch modules with other devices and environments.

Environment

NI switch modules use components whose performance can be adversely affected by operation outside the specified limits. For more information, refer to the *Environment* section in the specifications document of the device at <u>Related Documentation</u>.

For best performance, observe the following recommendations:

- Operate the NI switch module in a PXI-compliant chassis at an ambient temperature between 0 °C and 55 °C and at a relative humidity up to 90%.
- Use a chassis that has a well-designed cooling system. All NI PXI chassis meet this requirement.
 - Note To ensure that the NI switch device operates at peak performance within the chassis, refer to <u>Chassis</u> <u>Recommendations</u>.
- Keep the NI switch device clean and free from contaminants.

Operating under high humidity (>90%) or dusty conditions may cause increased leakage between circuit components and can result in additional errors.

Chassis Recommendations

NI switch modules are designed to operate in any PXI-compliant chassis. Temperature rise of the switch module can vary with slot position in the chassis. Observe the following recommendations to minimize this temperature variation and to ensure normal operating conditions for the NI switch module:

- Perform routine maintenance of the chassis cooling fan filters to assure continuous cooling effectiveness and to keep dust off of the NI switch module components. NI recommends cleaning the chassis fan filters at a maximum interval of six months and keeping the chassis environment clean to minimize the amount of dust that enters the chassis. For more information about cleaning the chassis fan filters, refer to the documentation for your chassis.
- Install PXI filler panels in all empty slots.
- Verify that the PXI chassis fans that provide forced air remain unobstructed to allow for proper cooling of the PXI chassis, devices, and controller.

PXI Express Compatibility

In an effort to incorporate PCI Express signaling into PXI, the PXI Systems Alliance (pxisa.org) has defined a modification for PXI modules. On modified PXI modules, or PXI Express-compatible modules, the top rear connector is replaced with a smaller connector.

PXI Express-compatible modules preserve the following features:

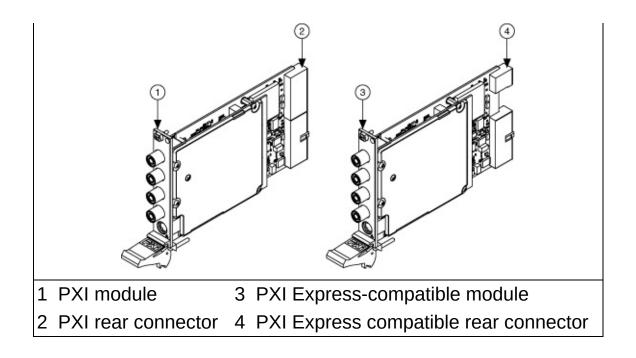
- PXI chassis compatibility—You can install PXI Expresscompatible modules in all existing PXI and PXI hybrid chassis.
 PXI hybrid chassis have slots that can accept either a PXI Express compatible or a PXI Express module. To determine if you have a PXI hybrid chassis, refer to your chassis documentation. For more information about PXI hybrid chassis, refer to the <u>PXI Express FAQ</u> on the NI Developer Zone Web site.
- Software compatibility—PXI Express compatibility does not require any changes to existing applications and/or driver software.
- Specifications—PXI Express compatibility does not alter module specifications.
- PXI communication—PXI Express compatibility preserves the speed and capability of all PXI communication.
- PXI timing and triggering—PXI Express compatibility supports existing PXI timing and PXI triggering capabilities.

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Note For future compatibility, PXI Express-compatible modules do not support 64-bit PCI or the local bus configurations.

For more information about PXI Express-compatible modules, visit ni.com/info and enter the following info code exphwr.

A comparision of a PXI and a PXI Express-compatible module is shown in the following figure.



Programming with NI-SWITCH

To program your switch module, select an API—NI-SWITCH or NI-DAQmx. Refer to the *NI Switches Getting Started Guide* for more information about these APIs.

With the NI-SWITCH API

This book covers programming your switch module with the NI-SWITCH API. The following topics are covered:

- <u>Getting Started</u>—How to begin creating your applications in LabVIEW, LabWindows/CVI, Visual C++, and Visual Basic
- <u>Programming Flow</u>—The programming flow for immediate operations, and scanning
- <u>Features</u>—Task-based information for using your switch module and its features
- <u>Examples</u>—Examples in NI LabVIEW, LabWindows/CVI, Visual C++, and Visual Basic
- <u>Error and Status Codes</u>—Error codes for NI-SWITCH and IviSwtch

With the NI-DAQmx API

To program your switch module with the NI-DAQmx API, refer to the *NI-DAQmx Help*.

Getting Started

This book explains how to begin using NI-SWITCH with your application development environment (ADE), lists files to include in your application, and includes special considerations for each ADE.



Note Install NI-SWITCH *before* you build an application.

To build an application, use one of the following ADEs:

- LabVIEW 7.1 or later
- LabWindows/CVI
- Visual C++
- <u>Visual Basic</u>

Using NI-SWITCH in LabVIEW

This topic assumes that you are using the NI LabVIEW ADE to manage your code development and that you are familiar with the ADE.

To develop an NI-SWITCH application in LabVIEW, follow these general steps:

- 1. Open a new or existing LabVIEW virtual instrument (VI).
- 2. From the **Functions** palette, select **Measurement I/O»NI-SWITCH** to access the NI-SWITCH API.
- 3. Select the VIs that you want to use and drop them on the block diagram to build your application.

Example Programs

Users with LabVIEW 7.1 or later can use the NI Example Finder to search or browse NI-SWITCH examples. Search examples by keyword to find a particular device or measurement VI. To browse the NI-SWITCH examples available in LabVIEW, launch LabVIEW, and select **Help*Find Examples**. To browse examples by task, select **Hardware Input and Output*Modular Instruments*NI-SWITCH (Switches)**; to browse examples by directory structure, select instr*niSwitch.

For more information about NI-SWITCH examples, refer to **Examples**.

Considerations for using the LabVIEW Real-Time Module

To develop an NI-SWITCH application in the LabVIEW Real-Time Module, follow the same steps used for developing any application in the LabVIEW Real-Time Module, with the addition of using the <u>NI-SWITCH</u> <u>LabVIEW VIS</u>.



Note Applications running NI-SWITCH in the LabVIEW Real-Time Module on an RT target may be compromised and/or slow at 64 MB.

Hardware Support

NI-SWITCH supports all National Instruments switch modules on RT targets.

Unsupported Features

When using NI switch modules with the LabVIEW Real-Time Module, the Switch Soft Front Panel is *not* supported.

Related Documentation

- For configuration instructions for remote systems, refer to the *Remote Systems Help* in Measurement & Automation Explorer (MAX) by selecting **Help*Help Topics*Remote Systems** in MAX.
- For more information on the LabVIEW Real-Time Module, refer to the *LabVIEW Real-Time Module User Manual* at <u>ni.com/manuals</u>.
- For additional troubleshooting and support information, refer to the LabVIEW Real-Time Support main page at <u>ni.com/support/labview/real-time</u>.

Using NI-SWITCH in LabWindows/CVI

This topic assumes that you are using the LabWindows/CVI ADE to manage your code development and that you are familiar with the ADE.

To develop an NI-SWITCH application in LabWindows/CVI, follow these general steps:

- 1. Open an existing or new project file.
- 2. Load the NI-SWITCH function panel at IVI\Drivers\NISWITCH.
- 3. Use the function panel to navigate the function hierarchy and to generate function calls with the proper syntax and variable values.



Note CVI 6.0 and earlier uses the header and .lib files in the \VXIpnp directories instead of IVI\ directories.

Example Programs

For more information about NI-SWITCH examples, refer to Examples.



Note CVI 6.0 and earlier users must use the example project files titled with a "6" suffix.

Using NI-SWITCH in Visual C++

This topic assumes that you are using the Microsoft Visual C++ ADE to manage your code development and that you are familiar with the ADE.

To develop an NI-SWITCH application in Visual C++, follow these general steps:

- 1. Open an existing or new Visual C++ project.
- 2. Create source files of type .c (C source code) or .cpp (C++ source code) and add them to the project. Make sure that you include the NI-SWITCH header file, NISWITCH.h, as follows in your source code files: #include "NISWITCH.h"
- 3. Specify the directory that contains the NI-SWITCH header file under the **Preprocessor**»**Additional include directories** settings in your compiler—for Visual C++ 6.0 these files are under **Project**»**Settings**»**C/C++**. The NI-SWITCH header files are located in the .\Include directory within your NI-SWITCH directory.
- 4. Add the NI-SWITCH import library niswitch.lib to the project under Link»General»Object/Library Modules. The NI-SWITCH import library files are located at IVI\Lib\msc.
- 5. Add NI-SWITCH function calls to your application.
- 6. Build your application.
- Tip You can use the #define topology names in niSwitchTopologies.h to get compile-time checking for topology spellings.

Example Programs

For more information about NI-SWITCH examples, including example locations, refer to <u>Examples</u>.

Special Considerations

String Passing

To pass strings, pass a pointer to the first element of the character array. Be sure that the string is null-terminated.

Parameter Passing

By default, C passes parameters by value. Remember to pass pointers to variables when you need to pass by address.

Using NI-SWITCH in Visual Basic

This topic assumes that you are using the Microsoft Visual Basic ADE to manage your code development and that you are familiar with the ADE.

To develop an NI-SWITCH application in Visual Basic, follow these general steps:

- 1. Open an existing or new Visual Basic project.
- 2. Create files necessary for your application and add them to the project.
- 3. Add a reference to the National Instruments Switch Library (NISWITCH), which is part of the NI-SWITCH DLL. In Visual Basic 6.0, select the **Project»References** menu option and National Instruments Switch Library (NISWITCH). If you do not see NISWITCH listed there, click **Browse** and locate NISWITCH_32.dll in your IVI\Bin directory.
- 4. Use the Object Browser <F2> to find function prototypes and constants.
- 5. Add NI-SWITCH function calls to your application.
- 6. Run your application by clicking **Run**.

Example Programs

To load an example project with Visual Basic 6.0 or later, select **File»Open Project**, then select the .vbp file of your choice.

For more information about NI-SWITCH examples, including example locations, refer to <u>Examples</u>.

Special Considerations

String Passing

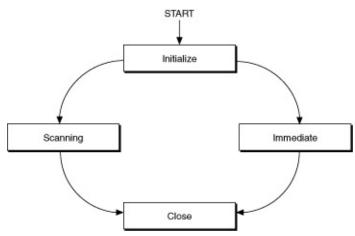
In Visual Basic, variables of data type String do not need special modifications to be passed to NI-SWITCH functions. Visual Basic automatically appends a null character to the end of a string before passing it (by reference, since strings cannot be passed by value in Visual Basic) to a procedure or function.

Parameter Passing

By default, Visual Basic passes parameters by reference. Prepend the ByVal keyword if you need to pass by value.

Programming Flow

The following diagram shows the programming flow of applications using NI-SWITCH.



Tip For more information about configuring attributes or setting properties, refer to <u>Setting and Checking Properties and Attributes</u>.

Initialization

For any application you write, call the <u>niSwitch Initialize With Topology</u> VI or the <u>niSwitch_InitWithTopology</u> function to establish communication with the switch.

Use the niSwitch Initialize With Topology VI or the niSwitch_InitWithTopology function to establish a session with the switch and send initialization commands that set the instrument to the state necessary for NI-SWITCH operation. The niSwitch Initialize With Topology VI or the niSwitch_InitWithTopology function also verifies that NI-SWITCH supports the switch, resets the switch to a known state, returns a ViSession handle used to identify the instrument in all subsequent NI-SWITCH calls, and allows you to set the topology of the switch, including simulation.

The niSwitch Initialize With Topology VI and the niSwitch_InitWithTopology function override the topology for the switch module you set in Measurement & Automation Explorer (MAX). Refer to the *NI Switches Getting Started Guide* for information on configuring your switch module in MAX.

Resource Names

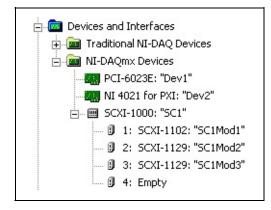
To establish a session with the correct switch module, you must pass a resource name to the niSwitch Initialize With Topology VI or the niSwitch_InitWithTopology function. The syntax of the resource name depends on where in MAX you configured your switch module—under NI-DAQmx Devices, Traditional NI-DAQ (Legacy) Devices, or PXI System.



Note Existing NI-SWITCH applications may use additional suffixes in the resource name (such as ::SCANNER, ::INDEP, or ::MATRIX). While these suffixes are still supported, they are unnecessary with NI-SWITCH 2.0. Refer to Legacy Programming for more information.

MAX Configuration Under NI-DAQmx Devices

If you configured the switch module under NI-DAQmx Devices in MAX, the resource name is the string in quotes. For example, the resource name of the first NI SCXI-1129 in the following figure would be SC1Mod2. Pass this string to the niSwitch Initialize With Topology VI or the niSwitch_InitWithTopology function. You can rename the resource name for switch modules configured as DAQmx devices simply by clicking on the device in MAX and entering a new name.



MAX Configuration Under Traditional NI-DAQ (Legacy) Devices

If you configured the switch module in MAX under the Traditional NI-DAQ (Legacy) Devices category in the Configuration pane, the resource name syntax is:

SCXI[chassis ID]::[slot number]

For example, the resource name of the first NI SCXI-1129 for the following configuration would be SCXI1::2. "1" denotes the chassis ID and "2" the slot number. Pass this string to niSwitch Init With Topology.

1				
Devices and Interfaces				
😑 💼 Traditional NI-DAQ Devices				
- MI 4021 for PXI (Device 8)				
- MI 4060 for PXI (Device 4)				
🖃 📟 SCXI-1000 (Chassis 1)				
🔋 Module 1 : SCXI-1102				
🕖 Module 2 : SCXI-1129				
🔋 Module 3 : SCXI-1129				
I Module 4 : Empty				
🕣 🛅 NI-DAQmx Devices				

MAX Configuration Under PXI System

If the switch module appears in MAX under the PXI System category in the Configuration pane, the resource name syntax is:

PXI[bus number]::[device number]



Note The NI PXI-2566 and NI PXI-2593 appear under the PXI System folder, but can only be configured under NI-DAQmx Devices.

For example, the resource name of the NI PXI-2591 for the following configuration would be PXI2::12. "2" denotes the bus number and "1" denotes the device number. Pass this string to the niSwitch Initialize With Topology VI or the niSwitch_InitWithTopology function.

Alternative Initialization Methods

You can also open a session to the switch module by calling the <u>niSwitch</u> <u>Initialize</u> VI or the <u>niSwitch_init</u> function, or by calling the <u>niSwitch</u> <u>Initialize With Options</u> VI or the <u>niSwitch_InitWithOptions</u> function. The niSwitch Initialize VI or the niSwitch_init function performs all the functionality of the niSwitch Initialize With Topology VI or the niSwitch_InitWithTopology function except that it does *not* set the topology of the switch. Instead, the driver uses the topology you set in MAX for the switch module. The niSwitch Initialize VI or the niSwitch_init function is available for those interested in maintaining IVI-compliance. For more information about IVI, refer to <u>ivifoundation.org</u>.

In addition to performing all the functionality of the niSwitch Initialize VI or the niSwitch_init function, the niSwitch Initialize With Options VI or the niSwitch_InitWithOptions function optionally sets the initial state of the switch. With the niSwitch Initialize With Options VI or the niSwitch_InitWithOptions function, you can configure the topology, range checking, caching, coercion recording, simulation, and status reporting. Refer to the **option string** (optionString) parameter of niSwitch Initialize With Options VI or the niSwitch_InitWithOptions function.

Once you have initialized the switch, you must configure it.

Operation Modes

NI-SWITCH offers two methods for programming National Instruments switches, <u>immediate operations</u> and scanning. During <u>scanning</u>, each operation in the scan list occurs after an event. Immediate operations occur instantly, or as fast as the relay or relays can actuate.

Immediate Operations

During <u>immediate operations</u>, relays are actuated after each VI/function call rather than waiting for a trigger.

Scanning

Scanning is typically used when timing of connections must be synchronized with an event from another device, such as a measurement device (hardware-timed scanning), or must be timed by software (software-timed scanning).

Connection operations are entered in a <u>scan list</u> that is downloaded to the memory of the switch module. The first entry in the scan list is executed when the scan is initiated. The trigger settings determine how the switch advances through subsequent entries in the list. The scan list can be executed once or repeatedly.

There are three trigger schemes for scanning: <u>software trigger scanning</u> for software-timed scanning, <u>synchronous scanning</u> for hardware-timed scanning, and <u>handshaking</u> for hardware-timed scanning.

Close

When your program finishes, terminate the session with the <u>niSwitch</u> <u>Close</u> VI or the <u>niSwitch_close</u> function.

The niSwitch Close VI or the niSwitch_close function is essential for freeing resources, including deallocating memory, destroying threads, and freeing operating system resources. Every session that you initialize must be closed, even if an error occurs during your program. Although NI does not recommend it, when debugging an application, you can abort execution before reaching the niSwitch Close VI or the niSwitch_close function.

Setting and Checking Properties and Attributes

Properties and attributes allow access to advanced configuration options and information for LabVIEW and CVI\C\C++\VB respectively.

NI-SWITCH contains high-level VIs/functions that set most of the switch module properties/attributes. Use the high-level driver VIs/functions as much as possible because they handle order dependencies and multithread locking.

Properties

In LabVIEW, you can get (read) or set (write) properties with the <u>NI-SWITCH Property Node</u>. Refer to the niSwitch Property Node for more information.

Refer to <u>NI-SWITCH Properties</u> for a complete listing of NI-SWITCH properties.

Attributes

In C and Visual Basic, attributes are accessed with the niSwitch_SetAttribute and niSwitch_GetAttribute functions. These functions correspond to a particular data type. For example, to set NISWITCH_ATTR_CONTINUOUS_SCAN (data type ViBoolean), use the niSwitch_SetAttributeViBoolean function.

Refer to <u>NI-SWITCH Attributes</u> for a complete listing of NI-SWITCH attributes.

Setting Properties and Attributes Before Reading Them

Properties and attributes are modified when you set them or when you call a configuration VI or function that sets them, respectively. It is important to set the properties or attributes or call any configuration VIs or functions before reading back any property or attribute values for the following reasons:

- Values read are coerced depending on the current configuration of the session. If you read a property or attribute value and then set other properties or attributes, the value read may no longer be valid.
- The driver verifies that the configuration of the device is valid at the time the property or attribute is read. It is possible to get an error when reading a property or attribute if the configuration is not valid at that point, even when a setting later could make it valid.
- Reading properties or attributes causes the driver to verify the current configuration. If you change some of the settings later, those settings need to be validated again.



Note Perform all module configuration before writing data on output devices.

Features

This book explains how to program switches for the following features:

- <u>Scanning</u>
- Adding Additional Settling Time
- Disabling Digital Filtering
- Immediate Operations
- <u>Setting Source and Configuration Channels</u>
- Simulating a Switch

Scanning

The NI-SWITCH API offers the following three triggering schemes for scanning.

- Software trigger scanning
- <u>Synchronous scanning</u>
- Handshaking

Refer to the switch module documentation in <u>Devices</u> to determine if the switch module supports scanning.

Refer to <u>Software Trigger Scanning</u> for information on programming software triggers using NI-SWITCH. If you are scanning NI switches with an NI DMM, and you are using NI-SWITCH and NI-DMM APIs, refer to <u>Scanning NI Switches with NI Digital Multimeters</u>.

Software Trigger Scanning

To write a software trigger scanning program, complete the following steps:

- 1. Set the topology of the switch module using the <u>niSwitch Initialize</u> <u>With Topology</u> VI or the <u>niSwitch_InitWithTopology</u> function.
- 2. Set the **trigger input** (triggerInput) parameter to Software Trigger using the <u>niSwitch Configure Scan Trigger</u> VI or the <u>niSwitch ConfigureScanTrigger</u> function.
- 3. Set the number of times the switch cycles through the scan list, once or infinitely, using the <u>niSwitch Set Continuous Scan</u> VI or the <u>niSwitch_SetContinuousScan</u> function.
- Set up the list of connections using the <u>niSwitch Configure Scan</u> <u>List</u> VI or the <u>niSwitch_ConfigureScanList</u> function. Refer to <u>Scan</u> <u>Lists</u> for syntax information.
- 5. Initiate the scan using the <u>niSwitch Initiate Scan</u> VI or the <u>niSwitch InitiateScan</u> function. The first entry in the scan list is executed and the switch waits for software triggers to execute the subsequent entries in the list.
- 6. Execute each set of connections in the scan list by calling the <u>niSwitch Send Software Trigger</u> VI and the <u>niSwitch_SendSoftwareTrigger</u> function.
- 7. Terminate the scanning operation using the <u>niSwitch Abort Scan</u> VI or the <u>niSwitch_AbortScan</u> function.
- 8. Release resources using the <u>niSwitch Close</u> VI or the <u>niSwitch_close</u> function.

Refer to the <u>niSwitch Software Scanning</u> example.

Scanning NI Switches with NI Digital Multimeters

Several factors must be considered when you are scanning NI switches with NI digital multimeters (DMMs), including switch capabilities, chassis capabilities, and scanning mode. Depending on the hardware setup, <u>multiple module scanning</u> is only possible if <u>single module scanning</u> is possible. Single module scanning capabilities do not necessarily ensure that a multiple module scanning operation is possible. The following table lists the trigger inputs and outputs for all NI switches.

Trigger O	ptions for	National In	struments Swite	ches

Switch	INPUT Trigger Input	Output Trigger Output
SCXI-1127 SCXI-1128	SCXI trig 0, Front, Rear	SCXI trig 2, Front
SCXI-1129	all SCXI trig, Front, Rear	all SCXI trig, Front
SCXI-1130 SCXI-1166 SCXI-1167 SCXI-1193		ont, Rear
SCXI-1169 SCXI-1175 SCXI-1194 SCXI-1195		, Rear
PXI-2501 PXI-2503 PXI-2529 PXI-2530 PXI-2566 PXI-2567 PXI-2593		
F XI-2393	all PXI trig,	Front
PXI-2527 PXI-2532 PXI-2545 PXI-2546 PXI-2547 PXI-2548 PXI-2549 PXI-2554 PXI-2555 PXI-2556 PXI-2557 PXI-2558 PXI-2559 PXI-2564		

PXI-2565 PXI-2569 PXI-2570 PXI-2575 PXI-2576 PXI-2584 PXI-2585 PXI-2586 PXI-2590 PXI-2591 PXI-2594 PXI-2595 PXI-2596	all PXI trig
PXI-2590 PXI-2597	
PXI-2598	
PXI-2599	

where

SCXI trig refers to SCXI trigger lines 0-7

PXI trig refers to PXI trigger lines 0-7

Rear refers to the rear connector

Front refers to the front panel or terminal block

You can categorize different DMM/switch systems according to the DMM, the switch and the cable used. The following figure represents each possible system with a letter.

DMM/Switch System Options

Switch	SCXI	PXI	
DMM	In PXI/SCXI Combo Chassis	In Separate SCXI Chassis	Switches
Right Most Slot	Internal A PXI/SCXI Lines		PXI Trigger
Any PXI	AUX Tr	Lines 0 to 7 D	
Slot or Any PCI Slot	AUX Trigger Cable B SH9MD-AUX Cable C		Aux Trigger Cable E

The systems are classified as follows:

- System A—The DMM <u>controls</u> and triggers the SCXI switch using the internal PXI/SCXI lines of a PXI/SCXI combo chassis. The DMM is placed in the rightmost PXI slot of a combo chassis.
- System B—The DMM does not <u>control</u> the SCXI switch but triggers it using the <u>AUX trigger cable</u>. The SCXI switch is controlled by another device.
- System C—The DMM <u>controls</u> and triggers the SCXI switch using the <u>SH9MD-AUX cable</u>.
- System D—The DMM triggers the PXI switch using PXI trigger lines. PXI-4060 uses only PXI trigger lines 0 to 6. PXI-4070 uses PXI trigger lines 0 to 7.
- System E—A PXI or PCI DMM triggers the PXI switch using the <u>AUX trigger cable</u>.

The following table shows the scanning capabilities for every NI switch. The number after S or H indicates the setup number. For example, if you want to perform a synchronous scan with multiple SCXI-1130 modules using an AUX trigger cable, refer to setup 6. If you want to do handshaking with multiple PXI-2529 using PXI trigger lines, refer to setup 3. The links in the table direct you to Multiple Module Scanning setups. For single module setups, refer to <u>Single Module Scanning</u>.

Scanning Capabilities for National Instruments Switches

S١

SCXI-1127/1128

SCXI-1129

SCXI-1130/1166/1167/1193/1194/1195

PXI-

2501/2503/2527/2529/2530/2545/2546/2547/2548/2549/2554/2555/2556

PXI-2532/2565/2568/2569/2570/2575/2590/2591

SCXI-1160/1161/1163R/1190/1191/1192

where S is synchronous scanning and H is handshaking H^* indicates that handshaking is supported only with an NI 407x

As an alternative to synchronous scanning and handshaking VIs in NI-SWITCH, NI-DMM includes the NI-DMM/Switch Express VI. You can use the NI-DMM/Switch Express VI to configure and acquire a signal using NI-DMM with National Instruments digital multimeters (DMMs) and PXI or SCXI <u>multiplexer</u> switch modules. Refer to the *NI Digital Multimeters Help* at ni.com/manuals for more information about the NI-DMM/Switch Express VI.

Single Module Scanning

NI-SWITCH supports single module scanning for both PXI and SCXI switches in NI-SWITCH and NI-DAQmx.

NI-SWITCH

To scan individual switches using NI-SWITCH, you can write a <u>scan list</u> or use the programming <u>examples</u>.

NI-DAQmx

For information about developing a single switch scanning application using NI-DAQmx, refer to the *NI-DAQmx Help*.

Determining the Scanning Setup

The scanning setup is dependent on your hardware and triggering scheme. Based on your hardware and triggering scheme requirements, choose one of the following scanning setups:

PXI Scanning—Synchronous

- <u>Setup 1—Using Internal PXI Trigger Lines</u>
- <u>Setup 2—Using AUX Trigger Cable Connected to Front of PXI</u>
 <u>Switch</u>

PXI Scanning—Handshaking

- <u>Setup 3—Using Internal PXI Trigger Lines</u>
- Setup 4—Using AUX Trigger Cable Connected to Front of PXI Switch

SCXI Scanning—Synchronous

- <u>Setup 5—Using SH9MD-AUX Cable</u>
- <u>Setup 6—Using AUX Trigger Cable Connected to the Front of the</u>
 <u>SCXI Switch</u>
- <u>Setup 7—Using Internal PXI/SCXI Trigger lines</u>

SCXI Scanning—Handshaking

- Setup 8—Using SH9MD-AUX Cable
- <u>Setup 9—Using AUX Trigger Cable Connected to the Front of the</u>
 <u>SCXI Switch</u>
- <u>Setup 10—Using Internal PXI/SCXI Trigger lines</u>

Scan Lists

A scan list is a string composed of channel names and characters that define connections, disconnections, <u>triggering</u>, and timing of the scan.

Scan List Characters

The following table shows characters that can be used in a scan list when programming with NI-SWITCH.

Character(s)	Definition
->	Used in a connect action (channel1->channel2). For example, the string ch0->com0 connects CH0 to COM0.
~	Used with '->' in a disconnect action (~channel1->channel2). Valid only in <u>No Action</u> mode. For example, ~ch0->com0 means disconnect CH0 and COM0.
- 7	Wait for debounce, send scan advanced output signal, then wait for trigger input.
&	Separates connect and/or disconnect actions. For example, the string ch0->com0 & ch9->com1 means connect CH0 to COM0 and CH9 to COM1 (in no particular order and with minimal delay).
&&	Wait for debounce. For example, ch0->com0 && ch9- >com1 means connect CH0 to COM0, wait for the relays to <u>settle</u> , then connect CH9 to COM1.
	Used in a channel range (channelX:Y, where <i>X</i> and <i>Y</i> are integers). Text containing a channel range represents multiple scan list entries. For example, the string ch0:7->com0; represents eight scan list entries. A semicolon must appear after the connect action using a channel range.

Tip NI-SWITCH ignores whitespace and line returns. Use these to format the appearance of lengthy scan lists.

Scan List Entries

A scan list entry is the text delimited by semicolons (;). Scan lists are composed of one or more scan list entries. For example, the following scan list contains two scan list entries:

ch0->com0; ch1->com0;

Scan Modes

The scan mode affects how the driver interprets the scan list. Typical scanning applications use the Break Before Make scan mode.

Mode	Description
Break Before Make (default)	Connections from the previous <u>scan list entry</u> are automatically disconnected before executing the current scan list entry. Disconnect actions, such as ~channel1->channel2, are not valid in this mode.
No Action	Connections remain connected until they are explicitly disconnected by a disconnect action.
Break After Make	Currently not supported.

Scan List Examples

Example 1

Scan Mode: No Action

Scan List: ch0->com0; ~ch0->com0 && ch1->com0; ~ch1->com0 &&

Meaning:

- 1. Connect ch0 to com0.
- 2. Wait for debounce, send scan advanced signal, then wait for trigger input.
- 3. Disconnect ch0 from com0 and wait for debounce.
- 4. Connect ch1 to com0.
- 5. Wait for debounce, send scan advanced signal, then wait for trigger input.
- 6. Disconnect ch1 from com0 and wait for debounce.
- 7. If the scan is set to <u>continuous</u>, return to step 1; otherwise, end the scan.

Example 2

Scan Mode: Break Before Make Scan List: ch0->com0; ch1->com0;

Meaning:

The scan list in this example is equivalent to the scan list in Example 1. Notice that the <u>disconnect actions</u> in Example 1 are no longer required.

Example 3

Scan Mode: Break Before Make Scan List: ch0:1->com0;

Meaning:

This scan list is equivalent to Example 1 and Example 2. This scan list uses a <u>channel range</u> to reduce keystrokes.

Single Module Scanning - Synchronous

Refer to the trigger topic of the switch module in <u>Devices</u> for possible **Trigger Input** locations.

PXI Options

- <u>Setup 1—Using Internal PXI Trigger Lines</u>
- Setup 2—Using AUX Trigger Cable Connected to Front of PXI Switch

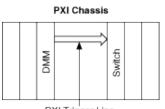
SCXI Options

- <u>Setup 5—Using SH9MD-AUX Cable</u>
- <u>Setup 6—Using AUX Trigger Cable Connected to the Front of the</u>
 <u>SCXI Switch</u>
- Setup 7—Using Internal PXI/SCXI Trigger lines

ΡΧΙ

Setup 1—Using Internal PXI Trigger Lines

All PXI switches can receive an input trigger from PXI trigger lines of a PXI chassis. In this setup, no cable is used between the DMM and the PXI switch for triggering. The DMM sends its MC signal to the PXI switch through a PXI trigger line.

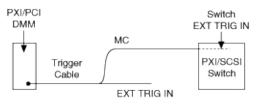


- PXI Trigger Line
- 1. Set **Trigger Input** to TTL*n* in niSwitch Configure Trigger.
- 2. Set **Measurement Complete Destination** in niDMM Configure Measurement to the same TTL*n* used in niSwitch Configure Trigger.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** locations.

Setup 2—Using AUX Trigger Cable Connected to Front of PXI Switch

Some PXI switches can receive an input trigger from the front panel or terminal block. This setup uses the AUX trigger cable to trigger the switch.



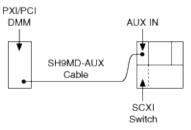
- 1. Connect the MC signal from the DMM to the external trigger input terminal on the front panel or in the terminal block of a PXI switch.
- 2. Set **Trigger Input** to External in niSwitch Configure Trigger.
- 3. Set **Measurement Complete Destination** to External in niDMM Configure Measurement.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** locations.

SCXI

Setup 5—Using SH9MD-AUX Cable

This setup uses an SH9MD-AUX cable between the NI 407*x* and the SCXI high-voltage analog bus connected to a switch in an SCXI-1000, SCXI-1001 or PXI-1010, or to the back of a PXI-1011. Refer to the <u>SCXI</u> Backplane Adapters in <u>Controlling and Triggering Switches</u> for more information.



- 1. Connect one end of the SH9MD-AUX cable to the 9-pin DIN connector on the front of the NI 407*x*.
- 2. Connect the other end of the SH9MD-AUX cable to the 9-pin DIN connector labeled AUX IN on the SCXI high-voltage analog bus.
- 3. Set **Trigger Input** to Rear Connector in niSwitch Configure Trigger.
- 4. Set **Measurement Complete Destination** to External in niDMM Configure Measurement.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** locations.

Setup 6—Using AUX Trigger Cable Connected to the Front of the SCXI Switch

Some SCXI switches can receive an input trigger on the front panel or terminal block. This setup uses an AUX trigger cable between the DMM and the front panel or in the terminal block of an SCXI switch. The switch is controlled by another device.



- 1. Connect the AUX trigger cable to the 9-pin DIN connector on the front of the DMM.
- 2. Connect the MC cable of the AUX trigger cable to the external

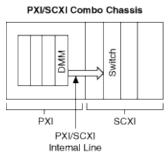
trigger input terminal (ext trig in) on the front panel or in the terminal block of the SCXI switch.

- 3. Set **Trigger Input** to Front Connector in niSwitch Configure Trigger.
- 4. Set **Measurement Complete Destination** to External in niDMM Configure Measurement.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** locations.

Setup 7—Using Internal PXI/SCXI Trigger Lines

This setup uses an internal trigger line of a PXI/SCXI combination chassis to trigger and control the SCXI switch. In this setup, no trigger cable is used between the NI PXI-407*x* and the SCXI switch. In the combination chassis, the rightmost slot of the PXI chassis has several internal lines available for SCXI communication and 2 internal trigger lines (TTL0 and TTL1) connected to SCXI trigger lines (SCXI Trig0 and SCXI Trig1).



- NI PXI-4060 Users
- 1. Install the NI PXI-4060 in the rightmost PXI slot.
- 2. Set **Measurement Complete Destination** to TTL0in niDMM Configure Measurement Complete Destination to send the MC signal to SCXI TRIG0.
 - NI PXI-407x Users
- 1. Install the NI PXI-407x in the rightmost PXI slot.
- 2. Set **Measurement Complete Destination** to LBR_TRIG0 in niDMM Configure Measurement Complete Destination to send the MC signal to SCXI TRIG0.

Single Module Scanning - Handshaking

Refer to the trigger topic of the switch module in <u>Devices</u> for possible **Trigger Input** locations.

PXI Options

- <u>Setup 3—Using Internal PXI Trigger Lines</u>
- Setup 4—Using AUX Trigger Cable Connected to Front of PXI Switch

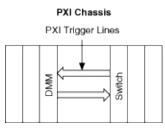
SCXI Options

- <u>Setup 8—Using SH9MD-AUX Cable</u>
- Setup 9—Using AUX Trigger Cable Connected to the Front of the SCXI Switch
- <u>Setup 10—Using Internal PXI/SCXI Trigger lines</u>

ΡΧΙ

Setup 3—Using Internal PXI Trigger Lines

To handshake with a PXI switch, you can use the internal PXI trigger lines of a PXI chassis. In this setup, no cable is used between the DMM and the PXI switch for triggering.

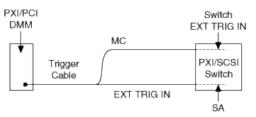


- 1. Set **Trigger Input** to TTL*n* in niSwitch Configure Trigger.
- 2. Set **Scan Advanced Output** to TTL*m* in niSwitch Configure Trigger.
- 3. Set **Measurement Complete Destination** to TTL*n* in niDMM Configure Measurement Complete Destination.
- 4. Set **Trigger Source** to TTL*m* in niDMM Configure Trigger.
- 5. Set **Sample Trigger Source** to TTL*m* in niDMM Configure Multi Point.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** and **Scan Advanced Output** locations.

Setup 4—Using AUX Trigger Cable Connected to Front of PXI Switch

Some PXI switches can receive their input trigger and send their scan advanced at the front panel or terminal block. This setup uses the AUX trigger cable to trigger the switch.



- 1. Connect the MC signal from the DMM to the external trigger input terminal on the front panel or in the terminal block of a PXI switch.
- 2. Connect the Ext Trig In signal of the DMM to the Scanner

Advanced terminal on the front panel or in the terminal block of the same PXI switch.

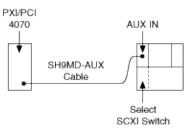
- 3. Set **Trigger Input** to External in niSwitch Configure Trigger.
- 4. Set **Scan Advanced Output** to External in niSwitch Configure Trigger.
- 5. Set **Measurement Complete Destination** to External in niDMM Configure Measurement Complete Destination.
- 6. Set **Trigger Source** to External in niDMM Configure Trigger.
- 7. Set **Sample Trigger Source** to External in niDMM Configure Multi Point.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** and **Scan Advanced Output** locations.

SCXI

Setup 8—Using SH9MD-AUX Cable

This setup uses an SH9MD-AUX cable between the NI 407*x* and the SCXI high-voltage analog bus connected to a switch in an SCXI-1000, SCXI-1001 or PXI-1010, or to the back of a PXI-1011. Refer to the <u>SCXI</u> Backplane Adapters in Controlling and Triggering Switches for more information.



Note Only the NI 407*x* can be used in this setup. NI-DMM 2.2 or later is required.



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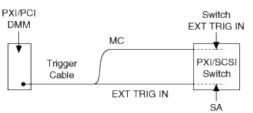
Note This setup cannot be used with the NI SCXI-1127/1128/1129. These modules cannot send their scan advanced signal to the rear connector.

- 1. Connect one end of the SH9MD-AUX cable to the 9-pin DIN connector on the front of the NI 407*x*.
- 2. Connect the other end of the SH9MD-AUX cable to the 9-pin DIN connector labeled AUX IN on the SCXI high-voltage analog bus.
- 3. Set **Trigger Input** to Rear Connector in niSwitch Configure Trigger.
- 4. Set **Scan Advanced Output** to Rear Connector in niSwitch Configure Trigger.
- 5. Set **Measurement Complete Destination** to External in niDMM Configure Measurement Complete Destination.
- 6. Set **Trigger Source** to AUX_TRIG_1 in niDMM Configure Trigger.
- 7. Set **Sample Trigger Source** to AUX_TRIG_1 in niDMM Configure Multi Point.

Setup 9—Using AUX Trigger Cable Connected to the Front of the SCXI Switch

SCXI switches can receive/send triggers from/to the front panel or terminal block. This setup uses an AUX trigger cable between the DMM

and the front panel or in the terminal block of an SCXI switch. The switch is controlled by another device.

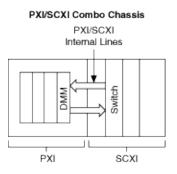


- 1. Connect AUX trigger cable to the 9-pin DIN connector on the front of the DMM.
- 2. Connect the MC cable of the AUX trigger cable to the external trigger input terminal (ext trig in) on the front panel or in the terminal block of the SCXI switch.
- 3. Connect the EXT TRIG IN cable of the AUX trigger cable to the scanner advanced terminal on the front panel or terminal of the same switch.
- 4. Set **Trigger Input** to Front Connector in niSwitch configure Trigger.
- 5. Set **Scan Advanced Output** to Front Connector in niSwitch configure Trigger for SCXI switches and to External for PXI switches.
- 6. Set **Measurement Complete Destination** to External in niDMM Configure Measurement Complete Destination.
- 7. Set **Trigger Source** to External in niDMM Configure Trigger.
- 8. Set **Sample Trigger Source** to External in niDMM Configure Multi Point.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** and **Scan Advanced Output** locations.

Setup 10—Using Internal PXI/SCXI Trigger Lines

This setup uses the internal trigger lines of a PXI/SCXI combination chassis to trigger the SCXI switches. In this setup, no trigger cable is used between the NI PXI-407x and the SCXI switch.



Note Only the NI PXI-407*x* can be used in this setup. NI-DMM 2.2 or later is required.

- 1. Install the NI PXI-407x in the rightmost PXI slot.
- 2. Set **Trigger Input** to TTL0 in niSwitch Configure Trigger.
- 3. Set **Scan Advanced Output** to TTL1 in niSwitch Configure Trigger.
- 4. Set **Measurement Complete Destination** to LBR_TRIG0 in niDMM Configure Measurement Complete Destination.
- 5. Set **Trigger Source** to LBR_TRIG1 in niDMM Configure Trigger.
- 6. Set **Sample Trigger Source** to LBR_TRIG1 in niDMM Configure Multi Point.

Refer to the switch module in <u>Devices</u> for possible **Trigger Input** and **Scan Advanced Output** locations.

Multiple Module Scanning

NI-SWITCH supports multiple module scanning for both PXI and SCXI switches in NI-DAQmx and NI-SWITCH.

NI-DAQmx

NI recommends NI-DAQmx for multiple module switch scanning. You can access the NI-DAQmx multiple module switch scanning programming examples at *<LabVIEW>\examples\DAQmx\Switches*. For more information about developing a multiple module switch scanning application using NI-DAQmx, refer to the NI Developer Zone document, *Multi-module Scanning with National Instruments Switches* at <u>ni.com/zone</u>.

NI-SWITCH

To scan multiple switches using NI-SWITCH, you can write a <u>scan list</u> or use the programming <u>examples</u>. When scanning multiple switch modules, you must duplicate the NI-SWITCH programming example for each switch you want to scan.

Determining the Scanning Setup

The scanning setup is dependent on your hardware and triggering scheme. Based on your hardware and triggering scheme, choose one of the following scanning setups:



Tip The niSwitch Multi Switch Synch Int, niSwitch Multi Switch Sync Ext, niSwitch Multi 27_28 Sync, niSwitch Multi Switch Hand Int, and niSwitch Multi Switch Hand Ext examples mentioned in the following sections are available at <u>ni.com/support</u>. Click **Example Code** and search for "Switch Multi-Module Scanning."

PXI Scanning—Synchronous

- <u>Setup 1—Using Internal PXI Trigger Lines</u>
- Setup 2—Using AUX Trigger Cable Connected to Front of PXI Switch

PXI Scanning—Handshaking

- Setup 3—Using Internal PXI Trigger Lines
- <u>Setup 4—Using AUX Trigger Cable Connected to Front of PXI</u>
 <u>Switch</u>

SCXI Scanning—Synchronous

- <u>Setup 5—Using SH9MD-AUX Cable</u>
- <u>Setup 6—Using AUX Trigger Cable Connected to the Front of the</u>
 <u>SCXI Switch</u>
- <u>Setup 7—Using Internal PXI/SCXI Trigger lines</u>

SCXI Scanning—Handshaking

- <u>Setup 8—Using SH9MD-AUX Cable</u>
- <u>Setup 9—Using AUX Trigger Cable Connected to the Front of the</u>
 <u>SCXI Switch</u>
- <u>Setup 10—Using Internal PXI/SCXI Trigger lines</u>

Multiple Module Scan Lists

Use the following process for populating the scan lists of the switches in the scanning operation using NI-SWITCH. The following example scans four consecutive channels of three switches. Refer to <u>Scan Lists</u> for basic scan list syntax.

Scan List for Switch #1

In the scan list of switch #1, enter the channels that you want to scan followed by the number of semicolons ";" equal to the sum of the channels in the other scan lists plus one. For the purpose of this example, the total number of semicolons after the channel entry is nine. The scan list looks like this: ch0:3->com0;;;;;;;;;;

The following figure illustrates the scan list for switch #1.



- 1. Channels of switch #1 to be scanned followed by one semicolon. This entry is the same as for scanning a single module.
- 2. Number of semicolons equal to the number of channels of switch #2 instructs switch #1 not to react to the triggers dedicated to switch #2. These semicolons are dummy entries corresponding to the channels of switch #2.
- 3. Number of semicolons equal to the number of channels of switch #3 instructs switch #1 not to react to the triggers dedicated to switch #3. These semicolons are dummy entries corresponding to the channels of switch #3.

Scan List for Switch #2

In the scan list for switch #2, enter the number of semicolons equal to the channels in the first scan list, then the channels that you want to scan in switch #2 and the number of semicolons equal to the sum of channels in the remaining scan lists plus one. For the purpose of this example, the number of semicolons before the channel entry is four, the number of semicolons after the channel entry is five. The scan list looks like this: ;;;;ch0:3->com0;;;;;

The following figure illustrates the scan list for switch #2.

····	$ ^{ch0:3} \rightarrow com0;$	2771
ЧĽ		<u> </u>
1	2	3

- Number of semicolons equal to the number of channels of switch #1 instructs switch #2 not to react to the triggers dedicated to switch #1. These semicolons are dummy entries corresponding to the channels of switch #1.
- 2. Channels of switch #2 to be scanned followed by one semicolon. This entry is the same as for scanning a single module.
- Number of semicolons equal to the number of channels switch #3 instructs switch #2 not to react to the triggers dedicated to switch #3. These semicolons are dummy entries corresponding to the channels of switch #3.

Scan List for Switch #3

In the scan list for switch #3, enter the number of semicolons equal to sum of the channels in all the previous scan lists, then the channels that you want to scan followed by one semicolon. For the purpose of this example, the number of semicolons before the channel entry is 8. The scan list looks like this: ;;;;;;;;ch0:3->com0;

The following figure illustrates the scan list for switch #3.



- 1. Number of semicolons equal to the number of channels of switch #1 instructs switch #3 not to react to the triggers dedicated to switch #1. These semicolons are dummy entries corresponding to the channels of switch #1.
- 2. Number of semicolons equal to the number of channels of switch #2 instructs switch #3 not to react to the triggers dedicated to switch #2. These semicolons are dummy entries corresponding to the channels of switch #2.
- 3. Channels of switch #3 to be scanned followed by one semicolon. This entry is the same as for scanning a single module.

Multiple Module Scanning - Synchronous

Refer to the trigger topic of the switch module in <u>Devices</u> for possible **Trigger Input** locations.

PXI Options

- <u>Setup 1—Using Internal PXI Trigger Lines</u>
- Setup 2—Using AUX Trigger Cable Connected to Front of PXI Switch

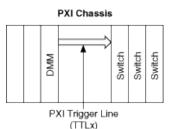
SCXI Options

- <u>Setup 5—Using SH9MD-AUX Cable</u>
- Setup 6—Using AUX Trigger Cable Connected to the Front of the SCXI Switch
- <u>Setup 7—Using Internal PXI/SCXI Trigger lines</u>

ΡΧΙ

Setup 1—Using Internal PXI Trigger Lines

All PXI switches can receive an input trigger from PXI trigger lines of a PXI chassis. In this setup, no cable is used between the DMM and the PXI switches for triggering. The DMM sends its MC signal to the PXI switches through a PXI trigger line.

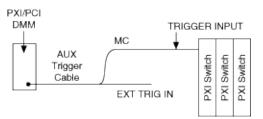


- 1. Open niSwitch Multi Switch Synch Int.
- 2. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- 3. Set **Trigger Input** to the same PXI trigger line for all switches. This input line should coincide with the destination of the DMM MC signal.

resource name 1	resource name 2	resource name 3
PXI15lot4	PXI2::15	PXI15lot3
topology name 1	topology name 2	topology name 3
2530/1-Wire 128×1 Mux 💌	2503/2-Wire 24x1 Mux	2529/2-Wire 4x32 Matrix 💌
scan list 1	scan list 2	scan list 3
ch0:3->com0;;;;;;;;;	;;;;;ch0:3->com0;;;;;;	;;;;;;;;r0->c0:3;
trigger input 1	trigger input 2	trigger input 3
TTLO	TTL0	TLO

Setup 2—Using AUX Trigger Cable Connected to Front of PXI Switch

Some PXI switches can receive an input trigger from the front panel or terminal block. This setup uses the AUX trigger cable to trigger the switches.



1. Connect the MC signal from the DMM to the external trigger input

terminal on the front panel or in the terminal block of one PXI switch.

- 2. Open <u>niSwitch Multi Switch Sync Ext</u>.
- 3. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- 4. Add niSwitch Route Trigger Input to the configuration of the switch where the AUX trigger cable from the DMM is connected.
- 5. Set Trigger Input Connector to Front Connector.
- 6. Set **Trigger Input Bus Line** to TTL*n*.
- 7. Set **Trigger Input** to the same TTL*n* for all switches.
- 8. Set **Measurement Complete Destination** to External in the DMM configuration.

resource name 1		resource name 2		resource name 3	
PXI2::14 topology name 1		PXI2::11 topology name 2		PXI2::12 topology name 3	
2503/2-Wire 24x1 Mux	T	2501/2-Wire 24x1 Mux	T	2590/4x1 Mux	Y
scan list 1		scan list 2		scan list 3	
ch0:3->com0;;;;;;;;;;		;;;;;ch0:3->com0;;;;;;		;;;;;;;;;ch0:3->com;	
trigger input 1		trigger input 2		trigger input 3	
TTL2		TTL2		TTL2	
trigger input connector					
Front Connector					

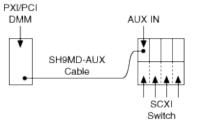
trigger input bus line

SCXI

Setup 5—Using SH9MD-AUX Cable

This setup uses an SH9MD-AUX cable between the DMM and the SCXI high-voltage analog bus connected to a switch in an SCXI-1000, SCXI-1001 or PXI-1010, or to the back of a PXI-1011. The DMM controls the SCXI switches and sends triggers to advance them through their respective scan lists. Refer to SCXI Backplane Adapters in Controlling and Triggering Switches for more information.

Note This program cannot be used with the NI SCXI-1127/1128. Refer to Legacy Programming for the NI SCXI-1127/1128 in Setup 5 for information on programming these modules.



- 1. Connect one end of the SH9MD-AUX cable to the 9-pin DIN connector on the front of the DMM.
- 2. Connect the other end of the SH9MD-AUX cable to the 9-pin DIN connector labeled AUX IN on the SCXI high-voltage analog bus.
- 3. Open niSwitch Multi Switch Sync Ext.
- 4. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- Add niSwitch Route Trigger Input to the configuration of the switch where the SH9MD-AUX cable is connected. Refer to the <u>SCXI</u> <u>Backplane Adapters</u> section to determine which module is connected to the SH9MD-AUX cable.
- 6. Set **Trigger Input Connector** to Rear Connector.
- 7. Set **Trigger Input Bus Line** to TTL*n*. The SCXI-1000 and SCXI-1001 have only SCXI trigger line 0 and 1 available. You can use all SCXI trigger lines in the NI PXI-1010 and PXI-1011.
- 8. Set **Trigger Input** to the same TTL*n* for all of the switches.
- 9. Set **Measurement Complete Destination** to External in the DMM configuration.

resource name 1	
SC1Mod4	
topology name 1	
1129/2-Wire 4x64 Matrix	T
scan list 1	
r0->c0:4;;;;;;;;;;;;;;;;;;;;;;;;	
trigger input 1	
TTLO	
trigger input connector	
Rear Connector	
trigger input bus line	
‡ TTLO	

resource name 2		resource name 3	
SC1Mod3 topology name 2		SC1Mod2 topology name 3	
1193/32×1 Mux	T	1130/1-Wire 256x1 Mux	T
scan list 2		scan list 3	
;;;;;ch0:4->com0;;;;;;;;;;;		;;;;;;;;;;ch0:9->com0;	
trigger input 2		trigger input 3	
TTLO		TTLO	

Legacy Programming for the NI SCXI-1127/1128

- 1. Open <u>niSwitch Multi 27_28 Sync</u>.
- 2. In legacy programming, the chassis is configured in Traditional NI-DAQ (Legacy). Enter SCXI1::3,4 to include switch modules in Slots 3 and 4 of chassis 1 in the scanning operation.
- 3. Select 1127/2-wire 32×1 Mux for the topology.

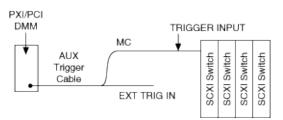
- 4. Set the wire mode of the modules being scanned (1-wire, 2-wire, or 4-wire) in Measurement & Automation Explorer by using the Channel tab in the module property.
- 5. In the scan list, enter the channels to be scanned as you normally would for a single module. Each entry should be preceded by scx!mdy! where x is the chassis number and y is the slot number of the switch module.
- 6. Set **Trigger Input** to the rear connector of the module cabled to the DMM.
- 7. Set Measurement Complete Destination to External in the DMM configuration.

resource name	
SCXI1::3,4	
topology name	
1127/2-Wire 32x1 Mux scan list	7
sc1!md3!ch0:31->com0; sc1!md4!ch0:31->com0;	
trigger input	
Rear Connector of Module 4	

Setup 6—Using AUX Trigger Cable Connected to the Front of the SCXI Switch

Some SCXI switches can receive an input trigger on the front panel or terminal block. This setup uses an AUX trigger cable between the DMM and the front panel or in the terminal block of an SCXI switch. The switches are controlled by another device.

Note This program cannot be used with the NI SCXI-1127 or the NI SCXI-1128. Refer to Legacy Programming for the NI SCXI-1127/1128 in Setup 6 for more information.



- 1. Connect the AUX trigger cable to the 9-pin DIN connector on the front of the DMM.
- 2. Connect the MC cable of the AUX trigger cable to the external trigger input terminal (ext trig in) on the front panel or in the terminal block of the SCXI switch.
- 3. Open <u>niSwitch Multi Switch Sync Ext</u>.
- 4. Enter channels in the scan lists according to the process described in <u>Multiple Module Scan Lists</u>.
- 5. Add niSwitch Route Trigger Input to the configuration of the switch where the AUX trigger cable is connected.
- 6. Set **Trigger Input Connector** to Front Connector.
- 7. Set **Trigger Input Bus Line** to TTL*n*. The SCXI-1000 and SCXI-1001 have only SCXI trigger line 0 and 1 available. You can use all SCXI trigger lines in the NI PXI-1010 and PXI-1011.
- 8. Set **Trigger Input** to the same TTL*n* for all of the switches.
- 9. Set **Measurement Complete Destination** to External in the DMM configuration.

resource name 1		resource name 2		resource name 3	
SC1Mod4 topology name 1	ſ	SC1Mod3 topology name 2		SC1Mod2 topology name 3	
1129/2-Wire Quad 4x16 Matrix	T	1193/32x1 Mux	T	1166/32-SPDT	T
scan list 1		scan list 2		scan list 3	
b1r0->b1c0:4;;;;;;;;;;	ſ.	;;;;;;ch0:4->com0;;;;;		;;;;;;;;;no0->com0;	
trigger input 1		trigger input 2		no1->com1;no2->com2;	
TTLO	£	TTLO			
trigger input connector				trigger input 3	_
Front Connector				TTL0	
trigger input bus line					

Legacy Programming for the NI SCXI-1127/1128

- 1. Open <u>niSwitch Multi 27_28 Sync</u>.
- 2. In legacy programming, the chassis is configured in Traditional NI-DAQ (Legacy). Enter SCXI1::3,4 to include switch modules in Slots 3 and 4 of chassis 1 in the scanning operation.
- 3. Select 1127/2-wire 32×1 Mux for the topology.
- 4. Set the wire mode of the modules being scanned (1-wire, 2-wire, or 4-wire) in Measurement & Automation Explorer by using the Channel tab in the module property.
- 5. In the scan list, enter the channels to be scanned as you normally would for a <u>single module</u>. Each entry should be preceded by scx!mdy! where *x* is the chassis number and *y* is the slot number of the switch module.
- 6. Set **Trigger Input** to the front connector of the module cabled to the DMM.
- 7. Set **Measurement Complete Destination** to External in the DMM configuration.

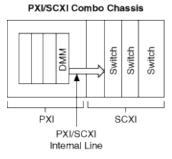
resource name	
SCXI1::3,4	
topology name	
1127/2-Wire 32x1 Mux	T
scan list	
sc1!md3!ch0:31->com0; sc1!md4!ch0:31->com0;	
trigger input	
Front Connector of Module 4	

Setup 7—Using Internal PXI/SCXI Trigger Lines

This setup uses the internal trigger lines of a PXI/SCXI combination chassis to trigger and control SCXI switches. In this setup, no trigger cable is used between the NI DMM installed in the rightmost PXI slot and the SCXI switches. In the combination chassis, the rightmost slot of the PXI chassis has several internal lines available for SCXI communication and 2 internal trigger lines (TTL0 and TTL1) connected to SCXI trigger lines (SCXI Trig0 and SCXI Trig1).

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Note This program cannot be used with the NI SCXI-1127 or the NI SCXI-1128. Refer to Legacy Programming for the NI SCXI-1127/1128 in Setup 7 for more information.



- 1. Open <u>niSwitch Multi Switch Sync Int</u>.
- 2. Enter channels in the scan lists according to the process described in <u>Multiple Module Scanning</u>.
- 3. Set **Trigger Input** to TTL0 for all switches.
 - NI PXI-4060 Users
- 4. Install the NI PXI-4060 in the rightmost PXI slot.
- 5. Set **Measurement Complete Destination** to TTL0 to send the MC signal to SCXI TRIG0.
 - NI PXI-407x Users
- 6. Install the NI PXI-407*x* in the rightmost PXI slot.
- 7. Set **Measurement Complete Destination** to LBR_TRIG0 to send the MC signal to SCXI TRIG0.

resource name 1		resource name 2		resource name 3	
SC1Mod1 topology name 1		SC1Mod2 topology name 2		SC1Mod3 topology name 3	
1129/2-Wire 4x64 Matrix	T	1193/32×1 Mux	Ŧ	1130/1-Wire 256x1 Mux	Y
scan list 1		scan list 2		scan list 3	
r0->c0:4;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;		;;;;;ch0:4->com0;;;;;;;;;;;;		;;;;;;;;;ch0:9->com0;	
trigger input 1		trigger input 2		trigger input 3	

Legacy Programming for the NI SCXI-1127/1128

- 1. Open <u>niSwitch Multi 27_28 Sync</u>.
- 2. In legacy programming, the chassis is configured in Traditional NI-DAQ (Legacy). Enter SCXI1::3,4 to include switch modules in Slots 3 and 4 of chassis 1 in the scanning operation.
- 3. Select 1127/2-wire 32×1 Mux for the topology.
- 4. Set the wire mode of the modules being scanned (1-wire, 2-wire, or 4-wire) in Measurement & Automation Explorer by using the Channel tab in the module property.
- 5. In the scan list, enter the channels to be scanned as you normally would for a single module. Each entry should be preceded by scx!mdy! where *x* is the chassis number and *y* is the slot number of the switch module.
- 6. Set **Trigger Input** to TTL0.
- 7. Set **Measurement Complete Destination** to LBR Trig 0 in the DMM configuration.

resource name	
SCXI1::1,2,3	
topology name	
1127/2-Wire 32x1 Mux	
scan list	
sc1!md1!ch0:31->com0; sc1!md2!ch0:31->com0; sc1!md3!ch0:31->com0;	
trigger input	
TTLO	

Multiple Module Scanning - Handshaking

Refer to the trigger topic of the switch module in <u>Devices</u> for possible **Trigger Input** locations.

PXI Options

- Setup 3—Using Internal PXI Trigger Lines
- Setup 4—Using AUX Trigger Cable Connected to Front of PXI Switch

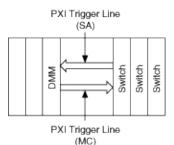
SCXI Options

- <u>Setup 8—Using SH9MD-AUX Cable</u>
- Setup 9—Using AUX Trigger Cable Connected to the Front of the SCXI Switch
- <u>Setup 10—Using Internal PXI/SCXI Trigger lines</u>

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Setup 3—Using Internal PXI Trigger Lines

To handshake with multiple PXI switches, you can use internal PXI trigger lines. In this setup, a trigger cable is not needed between the DMM and the PXI switches.

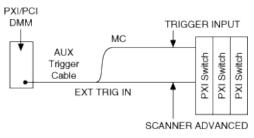


- 1. Open <u>niSwitch Multi Switch Hand Int</u>.
 - 2. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
 - 3. Set **Trigger Input** to the same PXI trigger line for all switches. This input line should coincide with the destination of the DMM MC signal.
 - 4. Set **Scan Advanced Output** to the same PXI trigger line for all switches. This output must coincide with the trigger source of the DMM.

resource name		resource name 2		resource name 3	
PXI2::14		PXI2::11		PXI2::12	
topology name		topology name 2		topology name 3	
2503/2-Wire 24x1 Mux	1	2501/2-Wire 24x1 Mux	-	2590/4x1 Mux	T
scan list		scan list 2		scan list 3	
ch0:3->com0;;;;;;;;;;		;;;;ch0:3->com0;;;;;;		;;;;;;;;ch0:3->com;	
trigger input		trigger input 2		trigger input 3	
TTLO		👌 TTLO		H TTLO	
scan advanced output		scan advanced output 2		scan advanced output 3	
∯ TTL1		⊕ mu		⊕ TTL1	

Setup 4—Using AUX Trigger Cable Connected to Front of PXI Switch

Some PXI switches can receive/send triggers from/to the front panel or terminal block. This setup uses the AUX trigger cable to trigger the switches.



- 1. Connect the MC signal from the DMM to the external trigger input terminal on the front panel or in the terminal block of one PXI switch.
- 2. Connect the Ext Trig In signal of the DMM to the Scanner Advanced terminal on the front panel or in the terminal block of the same PXI switch.
- 3. Open <u>niSwitch Multi Switch Hand Ext</u>.
- 4. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- 5. Add niSwitch Route Trigger Input and niSwitch Route Scan Advanced Output before niSwitch Commit of the switch where the AUX trigger cable from the DMM is connected.
- 6. Set **Trigger Input Connector** to Front Connector.
- 7. Set Scan Advanced Output Connector to Front Connector.
- 8. Set **Trigger Input Bus Line** to a PXI trigger line.
- 9. Set **Trigger Input** of all the switches to the same PXI trigger line of **Trigger Input Bus Line**.
- 10. Set **Scan Advanced Output Bus Line** to a different PXI trigger line.
- 11. Set **Scan Advanced Output** of all the switches to the same PXI trigger line of **Scan Advanced Output Bus Line**.
- 12. Set **Measurement Complete Destination** to External in the DMM configuration.
- 13. Set **Trigger Source** to External in the DMM configuration.

resource name PXI2::14 topology name T 2503/2-Wire 24x1 Mux scan list ch0:3->com0;;;;;;;;;;; trigger input TTLO scan advanced output TTL1 trigger input connector Front Connector trigger input bus line TTLO scan advanced output connector Front Connector scan advanced output bus line

TTL1

PXI2::11 topology name 2 2501/2-Wire 24x1 Mux scan list 2 ;;;;ch0:3->com0;;;;; trigger input 2 TTL0 scan advanced output 2 TTL1

T

resource name 2

resource name 3	
PXI2::12	
topology name 3	
2590/4x1 Mux	T
scan list 3	
;;;;;;;;ch0:3->com;	
trigger input 3	
TTLO	
scan advanced output 3	
TTL1	

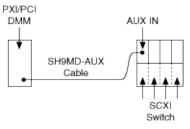
SCXI

Setup 8—Using SH9MD-AUX Cable

This setup uses an SH9MD-AUX cable between the NI 407*x* and the SCXI high-voltage analog bus connected to a switch in an SCXI-1000, SCXI-1001 or PXI-1010, or to the back of a PXI-1011. Refer to the <u>SCXI</u> Backplane Adapters in Controlling and Triggering Switches for more information.



Note Only the NI 407*x* can be used in this setup. NI-DMM 2.2 or later is required.



1. Open <u>niSwitch Multi Switch Hand Ext</u>.

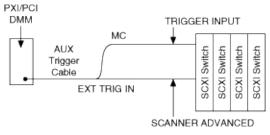
- Note This program cannot be used with the NI SCXI-1127/1128/1129. These modules cannot send a scanner advanced signal to the rear connector.
- 2. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- 3. Connect one end of the SH9MD-AUX cable to the 9-pin DIN connector on the front of the NI 407*x*.
- 4. Connect the other end of the SH9MD-AUX cable to the 9-pin DIN connector labeled AUX IN on the SCXI high-voltage analog bus.
- 5. Add niSwitch Route Trigger Input and niSwitch Route Scan Advanced Output before the niSwitch Commit of the switch where the SH9MD-AUX cable is connected. Refer to the <u>SCXI Backplane</u> <u>Adapters</u> section to determine which module is connected to the SH9MD-AUX cable.
- 6. Set **Trigger Input Connector** to Rear Connector.
- 7. Set Scan Advanced Output Connector to Rear Connector.
- 8. Set Trigger Input Bus Line to TTL0.
- 9. Set **Trigger Input** to TTL0 for all switches.

- 10. Set Scan Advanced Output Bus Line to TTL1.
- 11. Set **Scan Advanced Output** to TTL1 for all switches.
- 12. Set **Measurement Complete Destination** to External in the DMM configuration.
- 13. Set **Trigger Source** to Aux Trig 1 in the DMM configuration.

resource name 1		resource name 2		resource name 3			
SC1Mod4		SC1Mod3		SC1Mod2 topology name 3			
topology name 1		topology name 2					
1130/1-Wire 256x1 Mux	T	1130/1-Wire 256x1 Mux	T	1193/32x1 Mux	X		
scan list		scan list 2		scan list 3			
ch0:4->com0;;;;;;;;;;;;		;;;;;;ch0:4->com0;;;;;;;	1	;;;;;;;;;ch0:4->com0;			
trigger input		trigger input 2		trigger input 3			
TTLO	T	TTLO		TTL0			
scan advanced output		scan advanced output 2		scan advanced outp	ut 3		
🖞 TTL1		∂ TTL1		⊕ TTL1			
trigger input connector							
TTLO							
scan advanced output connect	tor						
scan advanced output bus line							

Setup 9—Using AUX Trigger Cable Connected to the Front of the SCXI Switch

SCXI switches can receive/send triggers from/to the front panel or terminal block. This setup uses an AUX trigger cable between the DMM and the front panel or in the terminal block of an SCXI switch. The switch is controlled by another device.



- 1. Connect AUX trigger cable to the 9-pin DIN connector on the front of the DMM.
- 2. Connect the MC cable of the AUX trigger cable to the external trigger input terminal (ext trig in) on the front panel or in the terminal block of one SCXI switch.

- 3. Connect the EXT TRIG IN cable of the AUX trigger cable to the scanner advanced terminal on the front panel or terminal of the same switch.
- 4. Open <u>niSwitch Multi Switch Hand Ext</u>.
 - Note This program cannot be used with the NI SCXI-1127 or the NI SCXI-1128.
- 5. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- 6. Add niSwitch Route Trigger Input and niSwitch Route Scan Advanced Output before the niSwitch Commit of the switch where the AUX trigger cable is connected.
- 7. Set Trigger Input Connector to Front Connector.
- 8. Set Scan Advanced Output Connector to Front Connector.
- 9. Set Trigger Input Bus Line to TTL0.
- 10. Set **Trigger Input** to TTL0 for all switches.
- 11. Set Scan Advanced Output Bus Line to TTL1.
- 12. Set Scan Advanced Output to TTL1 for all switches.
- 13. Set **Measurement Complete Destination** to External in the DMM configuration.
- 14. Set **Trigger Source** to External in the DMM configuration.

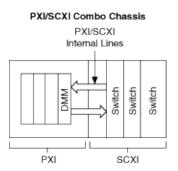
resource name	T	resource name 2		resource name 3			
SC1Mod4		SC1Mod3		SC1Mod2			
topolog y name			topology name 2	T	topology name 3		
1129/2-Wire 4x64 Matrix			1193/Dual 16x1 Mux		1166/32-SPDT	T	
scan list		scan list 2		scan list 3			
r0->c0:4;;;;;;;;;;;		;;;;;;ch0:4->com0;;;;;;		;;;;;;;;;;no0->com0;			
trigger input		trigger input 2		<pre>nc0->com0;no1->com1;nc1- >com1;</pre>			
TTLO		🕣 ТТLО					
scan advanced output		scan advanced output 2		trigger input 3			
TTL1	⊕ TTL1			TTLO			
		9		scan advanced output 3			
trigger input connector				TTL1			
Front Connector				9			
trigger input bus line							
TTLO							
scan advanced output connec	tor						
Front Connector							
scan advanced output bus line	e						
₿TTL1							

Setup 10—Using Internal PXI/SCXI Trigger Lines

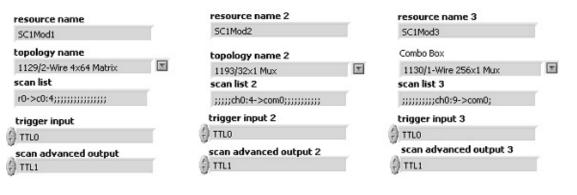
This setup uses the internal trigger lines of a PXI/SCXI combination chassis to trigger the SCXI switches. In this setup, no trigger cable is used between the NI PXI-407x and the SCXI switch.



Note Only the NI PXI-407*x* can be used in this setup. NI-DMM 2.2 or later is required.



- 1. Install the NI PXI-407x in the rightmost PXI slot.
- 2. Open niSwitch Multi Switch Hand Int.
 - Note This program cannot be used with the NI SCXI-1127 or the NI SCXI-1128.
- 3. Create scan lists according to the process described in <u>Multiple</u> <u>Module Scan Lists</u>.
- 4. Set **Trigger Input** to TTL0 for all switches.
- 5. Set **Scan Advanced Output** to TTL1 for all switches.
- 6. Set **Measurement Complete Destination** to LBR Trig 0 in the DMM configuration.
- 7. Set **Trigger Source** to LBR Trig 1 in the DMM configuration.



Adding Additional Settling Time

Some applications, such as high temperature or vibration measurements, may require additional <u>settling time</u> to acquire accurate measurements.

Setting the Settling Time

You can change the default settling time of a switch by using the <u>niSwitch</u> Property Node or the niSwitch SetAttributeViReal64 function.

- 1. Drop the <u>niSwitch Property Node</u> on the block diagram.
- 2. Right-click the property node and select the property Settling Time.
- 3. Right-click the Settling Time property and select Change to Write.
- 4. Right-click the **Settling Time** property and create a constant.
- 5. Set the constant to the amount of time (in seconds) to wait for settling.



 \mathbb{N} Note If you set the settling time of a switch module below the default settling time, NI-SWITCH coerces the value to the default settling time. Currently the settling time values for the NI SCXI-1127/1128/1160/1161/1163R/1190/1191/1192 cannot be changed.

Checking the Settling Time

You can check the default settling time of a switch by using the <u>niSwitch</u> <u>Property Node</u> or the <u>niSwitch_CheckAttributeViReal64</u> function.

- 1. Drop the <u>niSwitch Property Node</u> on the block diagram.
- 2. Right-click the property node and select the property <u>Settling</u> <u>Time</u>.
- 3. Right-click the **Settling Time** property and create an indicator.

Disabling Digital Filtering

Digital filtering, enabled by default, prevents the switch module from being triggered by pulses that are less than 150 ns on PXI trigger lines 0-7. Some devices used with a switch may only be able to send triggers that are less than 150 ns. For the switch module to recognize these pulse widths, digital filtering must be disabled.

You can disable digital filtering by using the niSwitch Property Node or the niSwitch SetAttributeViBoolean function. Complete the following steps to disable digital filtering.



Caution When digital filtering is disabled, it is possible for the switch module to be triggered by noise on the PXI trigger lines. If the device triggering the switch is capable of sending pulses greater than 150 ns, you should not disable digital filtering.

- 1. Drop the niSwitch Property Node on the block diagram.
- 2. Right-click the property node and select the **Digital Filter Enable** property.
- 3. Right-click the Digital Filter Enable property and select Change to Write.
- 4. Right-click the Digital Filter Enable property and create a control.
- 5. Press <Ctrl-E> to switch to the front panel.
- 6. Select **False**.

Immediate Operations

The following VIs perform immediate operations:

- niSwitch Connect Channels
- niSwitch Disconnect Channels
- niSwitch Disconnect All Channels
- niSwitch Relay Control

The following functions perform immediate operations:

- <u>niSwitch_Connect</u>
- <u>niSwitch_Disconnect</u>
- <u>niSwitch_DisconnectAll</u>
- <u>niSwitch_RelayControl</u>

When you use the immediate functions, NI-SWITCH determines if the path is valid and actuates the appropriate relays to make connecting and disconnecting channels easy for you.

To determine if the path you select is valid, NI-SWITCH refers to the topology you select in the <u>niSwitch Initialize With Topology</u> VI or the <u>niSwitch InitWithTopology</u> function. If the path is invalid for that topology, NI-SWITCH returns an error. Refer to the topology of the switch in <u>Devices</u> to determine valid channel names. Alternatively, you can run the <u>niSwitch Can Connect Channels?</u> VI or the <u>niSwitch_CanConnect</u> function to determine if the path is valid without physically connecting the channels. Refer to the hardware diagram of the switch module in <u>Devices</u> to determine valid relay names.



Note You can configure channels as <u>source or configuration</u> channels.

Connecting Channels

To connect channels, complete the following steps:

- 1. Run the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function.
- 2. Set **Channel 1** to one endpoint of the path you want to create.
- 3. Set **Channel 2** to the other endpoint of the path you want to create.

Disconnecting Channels

To disconnect channels, complete the following steps:

- 1. Run the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function.
- 2. Set **Channel 1** to one endpoint of the path you want to break.
- 3. Set **Channel 2** to the other endpoint of the path you want to break.

Disconnecting All Channels

To disconnect all channels, run the <u>niSwitch Disconnect All Channels</u> VI or the <u>niSwitch_DisconnectAll</u> function.

Individual Relay Control



Caution Controlling individual relays voids the source-channel protection provided in the predefined topologies.

To control individual relays, complete the following steps:

- 1. Run the niSwitch Relay Control VI or the niSwitch_RelayControl function.
- 2. Set **Relay Name** to the name of the relay you want to control. Refer to the hardware diagram of the switch for valid relay names.
- 3. Set **Relay Action** to Open or Close.
- 4. Run the <u>niSwitch Close</u> VI or the <u>niSwitch_close</u> function to end the session.

Setting Source and Configuration Channels

You can use NI-SWITCH to set the channel type. Set a channel as a *source channel* to provide additional software protection against unintentional damage to your system. Set a channel as a *configuration channel* to complete connections supported by the architecture of the switch, but unsupported in software.

Note The source channel type provides additional software protection when you use the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function, the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function, or <u>scanning</u> VIs/functions, but it does not provide additional protection when you manipulate relays directly using the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function. Thus, NI does not recommend combining these types of VI/function calls.

To edit a channel type, use the <u>niSwitch Property Node</u> or one of the <u>niSwitch_SetAttribute</u> functions.

The following figure represents a source channel (ab0) and a configuration channel (ch0) in the niSwitch Property Node.

	D .	¢	niSwitch	D
ab0 management	Þ		Active Channel	
Channel Configuration	•	Is	Source Channel	
ch0 managanaganaganaganaganaganaganaganagana	۲		Active Channel	
Channel Configuration	٩Is	Co	onfiguration Chann	nel

Source Channels

Set a source channel to indicate to the driver that a signal source is connected to the channel. NI-SWITCH does not allow two user-defined source channels to be directly or indirectly connected.



Note Switch modules with <u>form C</u> relays have a physical connection that always exists between the common (COM) and normally open (NO) or normally closed (NC) channel. NI-SWITCH may not reflect that connection in all cases, and hazardous or undesired connections can be created. For example, if you make a call to connect a COM channel to either an NO or NC channel, NI-SWITCH verifies that there are no source conflicts. However, operations such as the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect All</u> Channels VI or the <u>niSwitch Disconnect All</u> function may create connections that are not reflected in the software.

Configuration Channels

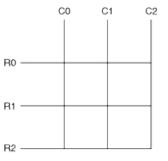
Set a configuration channel to allow NI-SWITCH to use the channel for internal path creation. Creating a column-to-column connection will fail in a matrix if a row channel is not set as a configuration channel.



Note Configuration channels may also be referred to as "reserved for routing" in other switch APIs.

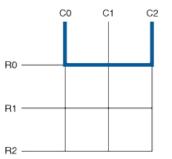
Creating a Route

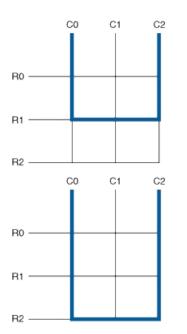
Refer the matrix in the following figure, and complete the following steps to create a route connecting C0 and C2.



- 1. Create a path between C0 and C2—Use the niSwitch Property Node or the appropriate niSwitch_SetAttribute function to set r0 as the configuration channel.
- 2. Create a route—Run the niSwitch Connect Channels VI or the niSwitch_Connect function with **channel 1** and **channel 2** set to c0 and c2, respectively.
- 3. Repeat steps 1 and 2 for rows r_1 and r_2 as configuration channels.

The following figures represent the routes you can create using R0, R1, and R2 as configuration channels, respectively.





Simulating a Switch

Simulate a switch using NI-SWITCH or Measurement & Automation Explorer (MAX) to develop, modify, and/or test an application without hardware. Using a simulated switch to test an application eliminates the risk of hardware damage. Additionally, you can use a simulated switch to evaluate an NI product for which you do not have hardware.

Tip As with an installed and configured switch, you can use the Switch Soft Front Panel to test the basic functionality of a simulated switch and troubleshoot an application.

NI-SWITCH

Complete the following steps to create and configure a simulated switch using NI-SWITCH:

- 1. Run the <u>niSwitch Initialize With Topology</u> VI or the <u>niSwitch_InitWithTopology</u> function.
- 2. Set the **simulate** parameter to Yes/true to ignore the resource name.
- 3. Specify the topology of the switch in the **topology** parameter. Refer to the switch module in <u>Devices</u> for a list of valid topology names.

Alternatively, you can run the <u>niSwitch Initialize With Options</u> VI or the <u>niSwitch_InitWithOptions</u> function.

MAX

Refer to the NI-DAQmx Simulated Devices topic in the *Measurement & Automation Explorer Help for NI-DAQmx* for detailed instructions about creating simulated switches.

NI-SWITCH Programming Examples

NI-SWITCH includes a collection of programming examples that demonstrate switch functionality. NI-SWITCH programming examples are instructional tools that you can use as stand-alone programs or integrate into your application. Whether you are developing a new application or modifying an existing application, the NI-SWITCH programming examples can facilitate your application development.

Use the following partial list to identify NI-SWITCH programming example(s) to aid in your application development:

- niSwitch Making Connections on a Switch—Demonstrates how to connect channels.
- niSwitch Software Scanning—Demonstrates how to scan a series of channels on a switch using software scanning.
- niSwitch DMM Switch Synchronous Scanning—Demonstrates how to scan a series of channels on a switch module and take measurements with an NI digital multimeter using synchronous scanning. NI-DMM 2.0 or later is required.
- niSwitch DMM Switch Handshaking—Demonstrates how to scan a series of channels on a switch module and take measurements with an NI digital multimeter using handshaking. NI-DMM 2.0 or later is required.
- niSwitch Controlling an Individual Relay—Demonstrates how to control an individual relay on a switch module.

Accessing the Programming Examples

Examples are available for the following ADEs:

- LabVIEW 7.1 or later
- LabWindows/CVI 7.1 or later
- Visual C/C++ 6.0
- Visual Basic 6.0

For example location, refer to the <u>NI-SWITCH Readme File</u>.

NI-DAQmx includes programming examples for switch functionality, such as multiple module scanning, that is supported in NI-DAQmx. Access the NI-DAQmx programming examples for switches at <*LabVIEW*>\examples\DAQmx\Switches.

Legacy Programming

If you have an existing application and your switches are configured under Traditional NI-DAQ (Legacy) Devices in MAX, the resource name suffixes remain valid. This book covers each switch compatible with this extended resource name syntax and lists the valid channels for each operation mode.



Note This information is intended for those who are modifying existing applications that use this extended resource name. These suffixes will be rendered obsolete in a future release of NI-SWITCH.

SCXI Switch Modules

The syntax for the resource name of an SCXI switch module that uses a suffix is:

SCXI[chassis ID]::slot number::[suffix]

where the possible suffixes are INDEP, MATRIX, SCANNER, and INSTR.

PXI Switch Modules

The syntax for the resource name of an SCXI switch module that uses a suffix is:

- PXI[bus number]::[device number]
- where the only suffix is INSTR.

NI SCXI-1160

The NI SCXI-1160 module has two possible legacy suffixes: INDEP and INSTR.

SCXIx::x::INDEP

When you configure the NI SCXI-1160 with INDEP, you can control the NI SCXI-1160 by calling the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function. Refer to the NI SCXI-1160 <u>hardware</u> <u>diagram</u> for valid relay names.

SCXI*x*::*x*::INSTR

When you configure the NI SCXI-1160 with INSTR, you can control the NI SCXI-1160 by calling the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function and the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function. Refer to the topology of the NI SCXI-1160 in <u>Devices</u> for valid channel names.

NI SCXI-1161

The NI SCXI-1161 module has two possible legacy suffixes: INDEP and INSTR.

SCXIx::x::INDEP

When you configure the NI SCXI-1161 with INDEP, you can control the NI SCXI-1161 by calling the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function. Refer to the NI SCXI-1161 <u>hardware</u> <u>diagram</u> for valid relay names.

SCXI*x*::*x*::INSTR

When you configure the NI SCXI-1161 with INSTR, you can control the NI SCXI-1161 by calling the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function and the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function. Refer to the topology of the NI SCXI-1161 in <u>Devices</u> for valid channel names.

NI SCXI-1163R

The NI SCXI-1163R module has two possible legacy suffixes: INDEP and INSTR.

SCXIx::x::INDEP

When you configure the NI SCXI-1163R with INDEP, you can control the NI SCXI-1163R by calling the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function. Refer to the NI SCXI-1163R <u>hardware</u> <u>diagram</u> for valid relay names.

SCXI*x*::*x*::INSTR

When you configure the NI SCXI-1163R with INSTR, you can control the NI SCXI-1163R by calling the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function and the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function. Refer to the topology of the NI SCXI-1163R in <u>Devices</u> for valid channel names.

NI SCXI-1190/1191

The NI SCXI-1190/1191 module has one possible legacy suffix: INSTR.

SCXI*x*::*x*::INSTR

When you configure the NI SCXI-1190/1191 with INSTR, you can control the NI SCXI-1190/1191 by calling the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function and the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function. Refer to the topology of the NI SCXI-1190/1191 in <u>Devices</u> for valid channel names.

NI SCXI-1192

The NI SCXI-1192 module has two possible legacy suffixes: INDEP and INSTR.

SCXIx::x::INDEP

When you configure the NI SCXI-1192 with INDEP, you can control the NI SCXI-1192 by calling the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function. Refer to the NI SCXI-1192 <u>hardware</u> <u>diagram</u> for valid relay names.

SCXI*x*::*x*::INSTR

When you configure the NI SCXI-1192 with INSTR, you can control the NI SCXI-1192 by calling the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function and the <u>niSwitch Disconnect Channels</u> VI or the <u>niSwitch Disconnect</u> function. Refer to the topologies of the NI SCXI-1192 in <u>Devices</u> for valid channel names.

NI SCXI-1127/1128

The NI SCXI-1127/1128 modules have three possible legacy suffixes: SCANNER, MATRIX, INDEP.

SCXIx::x::SCANNER

When programming, the general form for the resource name is as follows:

SCXIn::*m*1,*m*2,*m*3::SCANNER

where

n = chassis ID

m1,m2,m3 = module slot number(s)

For example, to create a scanner out of three NI SCXI-1127/1128 modules in Slots 5, 6, and 8 of chassis 2, the resource name would be as follows:

SCXI2::5,6,8::SCANNER

For just one NI SCXI-1127/1128, in Slot 4 of chassis 1, the resource name would be as follows:

SCXI1::4::SCANNER

To make all of chassis 1 a scanner, a shortcut you can use is as follows:

SCXI1::SCANNER

Refer to the topologies of the NI SCXI-1127/1128 in <u>Devices</u> for valid channel names.

SCXI*x*::*x*::MATRIX

When programming, the general form for the resource name is as follows:

SCXIn::m::MATRIX

where

n = chassis ID

m = module slot number

For example, to create a matrix out of an NI SCXI-1127/1128 module that you have in Slot 12 in chassis 1, the resource name would be as follows:

SCXI1::12::MATRIX

In this version, a unique session must be created for each matrix module. The matrix configuration uses the route functions. When an NI SCXI-1127/1128 is configured as a matrix, it creates a 4×8 (4 rows by 8 columns) matrix.



Note The NI SCXI-1127/1128, when configured as a matrix, must use the NI SCXI-1332 terminal block and must have the accessory field set appropriately in MAX; otherwise, an error will result during program execution.

Refer to the topologies of the NI SCXI-1127/1128 in <u>Devices</u> for valid channel names.

SCXIx::x::INDEP

The general form is as follows:

SCXIn::m::INDEP

where

n = chassis ID

m = module slot number

For example, to control a NI SCXI-1127/1128 that is in Slot 12 in chassis 1, the resource name would be as follows:

SCXI1::12::INDEP

A unique session must be created for each module. The independent configuration uses the low-level functions such as the <u>niSwitch Relay</u> <u>Control</u> VI or the <u>niSwitch_RelayControl</u> function. The switch names used in these low-level functions refer to physical switches on the module.

Refer to the NI SCXI-1127/1128 hardware diagram for valid relay names.

NI SCXI-1129

The NI SCXI-1129 module has the following legacy suffixes:

- MATRIX_4x16—four 4×16, 2-wire matrixes
- MATRIX_4x32—two 4×32, 2-wire matrixes
- MATRIX_4x64—one 4×64, 2-wire matrix
- MATRIX_8x16—two 8×16, 2-wire matrixes
- MATRIX_8x32—one 8×32, 2-wire matrix
- MATRIX_16x16—one 16×16, 2-wire matrix
- MATRIX—topology is determined by the terminal block configured in MAX

For example, to configure the NI SCXI-1129 in the 4×64 topology, the resource name is:

SCXIn::m::MATRIX_4x64

where

n = chassis ID

m = module slot number

You can also use MATRIX as a resource name. If you use MATRIX, NI-SWITCH picks a topology based on the terminal block you configured in MAX.

R

Note If you specify MATRIX as the resource name and do not configure a specific terminal block in MAX, then the NI SCXI-1129 defaults to the MATRIX_4x16 topology.

Any of the following resource names allows you to perform the following operations on the NI SCXI-1129:

- Route signals with the connect/disconnect functions
- Scan a list of channels
- Manually control individual switches

The analog bus relays are *not* automatically connected when configuring the NI SCXI-1129 in any of the above mentioned topology.

Routing Signals

Using the NI SCXI-1129, you can route signals in any one of six configurations: MATRIX_4x16, MATRIX_4x32, MATRIX_4x64, MATRIX_8x16, MATRIX_8x32, or MATRIX_16x16.

For example, calling the niSwitch Connect Channels VI or the niSwitch_Connect function with channel 1 set to B4R3 and channel 2 set to B4C3, routes signals from row 3 of bank 4 to column 3 of bank 4. Refer to <u>Topologies</u> for more information about matrix topologies.

Scanning a List of Channels

You can scan through a list of channels on the NI SCXI-1129 by specifying the triggering information and a scan list. The resource name does not change when scanning on the NI SCXI-1129. For example, you can use MATRIX_4x16 to route channels and scan on the NI SCXI-1129. Refer to scanning for more information on scanning options and the scan list syntax.

Analog Bus Configuration for Scanning

The analog bus channels are not automatically connected to the HVAB on the NI SCXI-1129. Connecting the analog bus channels enables a DMM that is cabled to the HVAB to take measurements. To close the analog bus channels, you can specify the analog bus as part of the scan list. For example, a scan list entry of r0->com0 && com0->ab0; connects row 0 to analog bus 0. You can also close the analog bus channels by calling the niSwitch Connect Channels VI or the niSwitch Connect function with **channel 1** set to com0 and with the **channel 2** set to ab0.

N

Note If the analog bus relays are closed during a scan, they remain closed until the niSwitch Abort Scan VI or the niSwitch AbortScan function is called.

Manual Control of Switches

You can use the <u>niSwitch Relay Control</u> VI or the <u>niSwitch_RelayControl</u> function to individually control the switches on the NI SCXI-1129.

Error and Status Codes

NI-SWITCH Codes

Hexadecimal Code	Error and Status Code
0xBFFA4001	NISWITCH_ERROR_SESSION_ALREADY_OPEN
0xBFFA4002	NISWITCH_ERROR_INVALID_RESOURCE_DESCRIPTC
0xBFFA4003	NISWITCH_ERROR_SCANNING_NOT_SUPPORTED
0xBFFA4004	NISWITCH_ERROR_MUST_SPECIFY_MODULE

0xBFFA4005	NISWITCH_ERROR_MODULE_FIFO_LENGTH_EXCE
0xBFFA4006	NISWITCH_ERROR_HW_COMMUNICATE_TMO
0xBFFA4007	NISWITCH_ERROR_TTL_BUS_REQUIRED
0xBFFA4008	NISWITCH_ERROR_MODULE_IS_BBM_ONLY

)xBFFA4009	NISWITCH_ERROR_1127_TTL1_CONFLICT
XBFFA400B	NISWITCH_ERROR_INVALID_DRIVER_SETUP_STR
	NISWITCH_ERROR_TOPOLOGY_NOT_SUPPORTE
xBFFA400D	NISWITCH ERROR INVALID TOPOLOGY
)xBFFA400D	NISWITCH_ERROR_INVALID_TOPOLOGY

0xBFFA400F	NISWITCH_ERROR_HANDSHAKING_INITIATION_CC
0xBFFA4010	NISWITCH_ERROR_LEGACY_DESCRIPTOR_DAQM
0xBFFA4011	NISWITCH_ERROR_DAQMX_DESCRIPTOR_LEGAC

0xBFFA4012	NISWITCH_ERROR_AMBIGUOUS_MODEL_CODE
0xBFFA4013	NISWITCH_ERROR_TRIGGER_INPUT_NOT_SUPPOF
0xBFFA4014	NISWITCH_ERROR_INVALID_TERMINALBLOCK_FOF
0xBFFA4015	NISWITCH_ERROR_CANT_INVERT_WHEN_SOURCE
0xBFFA4016	NISWITCH_ERROR_CONFLICTING_TRIGGER_ROUT
0xBFFA4017	NISWITCH_ERROR_INVALID_VALUE_FOR_DEVICE

0xBFFA4018	NISWITCH_ERROR_TRIGGER_POLARITY_CONFLICT

IviSwtch Codes

Hexadecimal Code	Error and Status Code
	IVISWTCH_ERROR_TRIGGER_NOT_SOFTWARE
0x3FFA2001	IVISWTCH_WARN_PATH_REMAINS
0x3FFA2002	IVISWTCH_WARN_IMPLICIT_CONNECTION_EXISTS
0xBFFA2001	IVISWTCH_ERROR_INVALID_SWITCH_PATH
0xBFFA2002	IVISWTCH_ERROR_INVALID_SCAN_LIST
0xBFFA2003	IVISWTCH_ERROR_RSRC_IN_USE
0xBFFA2004	IVISWTCH_ERROR_EMPTY_SCAN_LIST
0xBFFA2005	IVISWTCH_ERROR_EMPTY_SWITCH_PATH
0xBFFA2006	IVISWTCH_ERROR_SCAN_IN_PROGRESS

0xBFFA2007	IVISWTCH_ERROR_NO_SCAN_IN_PROGRESS
0xBFFA2008	IVISWTCH_ERROR_NO_SUCH_PATH
0xBFFA2009	IVISWTCH_ERROR_IS_CONFIGURATION_CHANNEL
0xBFFA200A	IVISWTCH_ERROR_NOT_A_CONFIGURATION_CHAI
0xBFFA200B	IVISWTCH_ERROR_ATTEMPT_TO_CONNECT_SOUF

IVISWTCH_ERROR_EXPLICIT_CONNECTION_EXIS
IVISWTCH_ERROR_LEG_MISSING_SECOND_CHA
IVISWTCH_ERROR_CHANNEL_DUPLICATED_IN_L
IVISWTCH_ERROR_CHANNEL_DUPLICATED_IN_F
IVISWTCH_ERROR_PATH_NOT_FOUND
IVISWTCH_ERROR_DISCONTINUOUS_PATH

0xBFFA2013	IVISWTCH_ERROR_CANNOT_CONNECT_DIRECTL
0xBFFA2014	IVISWTCH_ERROR_CHANNELS_ALREADY_CONNE
0xBFFA2015	IVISWTCH_ERROR_CANNOT_CONNECT_TO_ITSEI
0xBFFA2016	IVISWTCH_ERROR_MAX_TIME_EXCEEDED

Operating System Support

For more information about the supported operating system (OS) for your device, refer to the <u>NI-SWITCH Readme File</u>.



Note Some devices are not supported under Windows Vista. Refer to the <u>NI-SWITCH Readme File</u> for a complete list of products and their OS support.

Programming with NI-DAQmx

To program your switch module with NI-DAQmx, refer to the *NI-DAQmx Help*.

Using NI Switches in IVI

Create an IVI logical name and a corresponding driver session to use National Instruments switch modules in IVI. Complete the following steps to create an IVI logical and a corresponding driver session.

- 1. Open Measurement & Automation Explorer (MAX).
- 2. Expand **IVI Drivers** in the MAX configuration tree.
- 3. Create a new driver session.
 - a. Right-click **Driver Sessions** in the configuration tree, and select **Create New (case-sensitive)**. The configuration panel opens in the configuration window.
 - b. Complete the following steps to configure the new driver session.
 - 1. Select the **Software** tab, and select **niSwitch** from the Software Module listbox.
 - 2. Select the **Hardware** tab, and select the switch module you want to use from the Hardware Asset listbox.
 - Note To create a new hardware asset, click **Create New** to the right of the Hardware Asset listbox.
 - 3. Select the **General** tab, and select **Don't Simulate** from the Simulate With listbox.
 - In the Driver Setup textbox, enter the driver setup string for the switch module you want to use.
 Refer to <u>Determining the Driver Setup String</u> for more information about driver setup strings.
- 4. Create a new logical name.
 - a. Right-click **Logical Names** in the configuration tree, and select **Create New (case-sensitive)**. The configuration panel opens in the configuration window.
 - b. To configure the new logical name, select the driver session that you created in step 3 from the Driver Session listbox.



Note To view the properties of the driver session you have selected, click **Go To** to the right of the

Driver Session listbox.

5. To save the IVI configuration, click **Save IVI Configuration** at the top of the configuration view. If you decide not to save your changes, click **Revert** to revert to the previous configuration.

Determining the Driver Setup String

Complete the following steps to determine the driver setup string for the switch module.

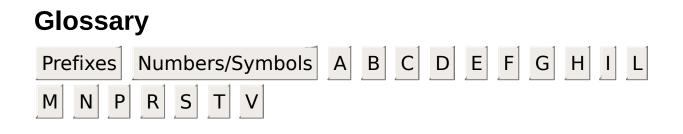
- 1. Determine the topology name.
 - a. Open the NI Switches Help file.
 - b. Select the **Contents** tab.
 - c. Expand the **Devices** book, and select the switch module you want to use. The device overview for the switch module is displayed in the help window.
 - d. In the device overview, the Operation Modes table(s) lists the topology and software names for each supported topology. The topology name is the first software name listed in the table *not* the constant name in parenthesis. For example, if you want to use the NI SCXI-1127 in the 64x1 Mux mode, the topology name is "1127/1-Wire 64x1 Mux" *not*

"NISWITCH_TOPOLOGY_1127_1_WIRE_64X1_MUX."

- 2. Using the topology name, determine the driver setup string.
 - NI-DAQmx devices

The driver setup string is topology:<*topology name*>. If you are using the NI SCXI-1127 in the 64x1 Mux mode, for example, the driver setup string is topology:1127/1-Wire 64x1 Mux.

- Traditional NI-DAQ (Legacy) or NI-VISA based devices The driver setup string is topology:<*topology name*>;resourcetype:legacy. If you are using the NI SCXI-1127 in the 64x1 Mux mode, for example, the driver setup string is topology:1127/2-Wire 32x1 Mux;resourcetype:legacy.
 - Note This driver setup string is valid only for NI-VISA based devices (i.e. NI PXI-2501/2503/2565/2590/2591 and SCXI switch modules) that have been created under Traditional NI-DAQ (Legacy) Devices in MAX. Legacy support is maintained for existing system installations. All new NI switch modules are supported under NI-DAQmx and should be configured as such.



Prefixes

Symbol	Prefix	Value
р	pico	10 -12
n	nano	10 ⁻⁹
μ	micro	10 -6
m	milli	10 ⁻³
k	kilo	10 ³
М	mega	10 6
G	giga	10 ⁹
Т	tera	10 12

Numbers/Symbols

	-	
nV	nanovolts	10 ⁻⁹ volts
μV	microvolts	10 ⁻⁶ volts
μΩ	microohms	10 ⁻⁶ ohms
mΩ	milliohms	10 ⁻³ ohms
MΩ	megaohms	10 ⁶ ohms
pА	picoamps	10 ⁻¹² amperes
nA	nanoamps	10 ⁻⁹ amperes
μA	microamps	10 ⁻⁶ amperes
mΑ	milliamps	10 ⁻³ amperes

Α

А	amps
AC	alternating current
AC current	The measurement of the electrical current (in amperes) of AC signals. The measurement is typically made using rms averaging.
AC Voltage	A voltage that changes as a function of time.
ADE	application development environment—A software environment incorporating the development, debug, and analysis tools for software development. LabVIEW, Measurement Studio, and Visual Studio are examples.
American Wire Gauge	AWG—A U.S. standard set of non-ferrous wire conductor sizes. Gauge means the diameter. Non-ferrous includes copper and also aluminum and other materials, but is most frequently applied to copper household electrical wiring and telephone wiring. Typical household wiring is AWG number 12 or 14. Telephone wire is usually 22, 24, or 26. The higher the gauge number, the smaller the diameter and the thinner the wire. Since thicker wire carries more current because it has less electrical resistance over a given length, thicker wire is better for longer distances. For this reason, where extended distance is critical, a company installing a network might prefer telephone wire with the lower-gauge, thicker wire of AWG 24 to AWG 26.
analog	A signal whose amplitude can have a continuous range of values.
API, application programming interface	 A standardized set of subroutines or functions along with the parameters that a program can call. A set of functions exported by a library.

В

bandwidth The range of frequencies present in a signal, or the range of frequencies to which a measuring device can respond.

Break- A type of switching contact that is completely disengaged

Before- from one terminal before it connects with another terminal.

Make

bus, The group of electrical conductors that interconnect buses individual circuitry in a computer. Typically, a bus is the expansion vehicle to which I/O or other devices are

connected. Examples of PC buses are the PCI, AT(ISA), and EISA bus.

С	
capacitance	The ability to hold an electrical charge.
СН	channel
channel	 Pathway from a CPU or, on a network, between computers.
	 A channel can also be an input connection to a data acquisition system or to an instrument, such as an oscilloscope or logic analyzer.
	 Pin or wire lead to which you apply or from which you read an analog or digital signal. Analog signals can be single-ended or differential. For digital signals, channels group to form ports. Ports usually consist of either four or eight digital channels.
characteristic impedance	A transmission line parameter that determines how propagating signals are transmitted or reflected in the line.
CMOS	Complementary-Metal-Oxide Semiconductor
cold junction, cold-junction,	 A method of compensating for inaccuracies in thermocouple circuits.
cold-junction compensation	2. An artificial reference level that compensates for ambient temperature variations in thermocouple measurement circuits. IC temperature sensors are linear and their output is expressed as mV/ °C. A 10 mV/°C sensor, for example, outputs 250 mV at 25 °C. Thermistor outputs, however, are nonlinear. Therefore, thermistor output is specified as the voltage range over a defined temperature range (<i>x</i> volts at 50 °C to <i>y</i> volts at 0 °C).
cold switching	The process of closing the relay contacts before applying voltage and current, as well as removing voltage and current before opening the contacts.

COM The common terminal of a multiplexer.

contact bounce	The intermittent and usually undesired opening of mechanical relay contacts during closure, or closing of contacts during opening. The contact bounce period depends upon the type of relay and varies from .5 ms for small reed relays to 10-20 ms for larger relays.
contact life	The maximum number of expected switch or relay closures with a given voltage/current load before failure.
contact material	The material of which the contacts of a relay are made.
contact potential	A voltage produced between contact terminals due to the temperature gradient across the relay contacts.
contact rating	The maximum voltage, current, and power capacities of relay contacts under specified environmental conditions.
contact resistance	The electrical resistance across closed contacts.
contactor	An electric switch for controlling a motor or other electric device.
Controller	An intelligent device (usually involving a CPU) that is capable of controlling other devices.
crosspoint switch	An integrated circuit term; a switch that connects the signal on an input bus to one or more output buses. Also referred to as a switch matrix.
current	The rate of flow of electric charge measured in amperes.
current drive	The ability to supply a given output current. Refer to current sinking.
current drive capability	The amount of current a digital or analog output channel is capable of sourcing or sinking while still operating within voltage range specifications.
current excitation	The channel of a DMM that emits a current across a resistor in a 4-wire measurement.
current loop	A communications method that transmits data as current flow over relatively long distances and through environments with relatively high noise.

current sinking	The ability of a signal generator or output of a DAQ device to dissipate current for analog or digital output signals. Refer to <u>current drive</u> .
current sourcing	The ability of a DAQ device or instrument device to supply current for external devices, such as sensors or conditioning units. ICP is one technique for supplying DC current to transducers with built-in amplifiers.

D	
DAQ	 Data acquisition—The process of collecting and measuring electrical signals from sensors, transducers, and test probes or fixtures and inputting them to a computer for processing. Data acquisition—The process of collecting and measuring the same kinds of electrical signals with A/D and/or DIO devices plugged into a computer, and possibly generating control signals with D/A
	and/or DIO devices in the same computer.
dB	decibel
DC	direct current—Although the term speaks of current, many different types of DC measurements are made, including DC voltage, DC current, and DC power.
DC coupled	Allowing the transmission of both AC and DC signals.
DC current	The electric current of a DC signal.
DC gain error	The gain error on the DC component of a signal. This specification is not applicable when the device has AC input coupling.
DC offset	The DC voltage or current present on a signal.
	A typical technique in many instruments is to put the instrument in DC offset calibration mode, where the external signal is removed. Then, the internally generated DC offset signal is measured, and in some cases, stored, and compensated for.
DC voltage	The direct current (non-changing) component of a voltage. In practice, the DC voltage should not change over the period of observation, that is, the measurement time.
dielectric constant	The ratio of a capacitance using a given dielectric to the capacitance using a vacuum as a dielectric.
differential	the voltage difference between two junctions

thermal EMF	
DMM	digital multimeter—A digital instrument capable of measuring several different fundamental electrical characteristics, most often voltage, resistance, and current.
DPDT	double-pole double-throw
drive current	the current that flows through the coil of an electromechanical relay to move the armature
dry circuit switching	Switching below specified levels of voltage and current to minimize any physical and electrical changes in the contact junction.
dry reed relay	A glass enclosed, hermetically sealed, magnetically actuated contact. Typical atmosphere inside the glass enclosure is nitrogen.

Ε

E Series	A standard architecture for instrumentation-class, multichannel data acquisition devices.
electrical life	The number of switch cycles, under load, before the contact resistance of a relay rises above 1 Ω .
electromechanical relay	A type of relay composed of a coil, an armature mechanism, and contacts.
EMF	electromotive force—The electrical force present without a load on the circuit.

F

- FET switch Field-Effect Transistor—A type of relay composed of several CMOS transistors. A voltage applied to the control circuitry connects the source and drain of a transistor network.
- form A classification of relays categorized by the number of poles, throws, and default position of the relay.
- frequency The basic unit of rate, measured in events or oscillations per second using a frequency counter or spectrum analyzer. Frequency is the reciprocal of the period of a signal.
- front panel 1. The interactive user interface of a VI. Modeled after the front panel of physical instruments, it is composed of switches, slides, meters, graphs, charts, gauges, LEDs, and other controls and indicators.
 - 2. The physical front panel of an instrument or other hardware

FunctionsThe LabVIEW palette containing block diagram structures,
constants, communication features, and VIs.

fundamental The component of a periodic wave whose frequency, f0, is the greatest common divisor of the harmonic frequencies, and the inverse of the wave period T.

G

generalpurpose A topology composed of multiple isolated relays used to connect one input to one output.

ground

- 1. A pin.
- 2. An electrically neutral wire that has the same potential as the surrounding earth. Normally, a noncurrent-carrying circuit intended for safety.
- 3. A common reference point for an electrical system.

Н

handshaking	A type of scanning similar to synchronous scanning except that the switch sends a digital pulse back to the other device after each scan list entry has been executed.
harmonic	Pertaining to whole-number multiples of the fundamental frequency of a sound or signal.

HVAB high-voltage analog bus

I

impedance	 The electrical characteristic of a circuit expressed in ohms and/or capacitance/inductance. resistance
inductance	The characteristic of a coil that generates a voltage due to changes in the current. An inductor creates a voltage that is the derivate of the current, while a capacitor creates a voltage that is the integral of the current.
insertion loss	The attenuation of signals due to the impedance when passing the signals through a switching module or system. Specified as a decibel value (dB) over a frequency range.
isolation voltage	The voltage that an isolated circuit can normally withstand, usually specified from input to input and/or from any input to the amplifier output, or to the computer bus.

L

- LabVIEW Laboratory Virtual Instrument Engineering Workbench—A program development application based on the programming language G and used commonly for test and measurement purposes.
- latching The ability to keep a relay contact in its current state if power is removed.
- latchingA type of electromechanical relay without a default positionrelaythat remains in its last position when the drive current stopsflowing.
- LED light-emitting diode

load Resistance, capacitance, and (often) inductance presented impedance by a load to an output amplifier. The recommended load impedance is the minimum resistance and maximum capacitance that the circuitry connected to the analog output should have.

load The ability of a power supply to keep its output voltage or regulation current at a constant value with a changing output load.

Μ

make-before- Breaking and completing two paths simultaneously. break

- matrix A topology in which you can connect multiple inputs to multiple outputs organized as columns and rows.
- MAX Measurement & Automation Explorer—A controlled, centralized configuration environment that allows you to configure all of your NI devices.

Measurement The following is a description of measurement Category categories:

- Measurement Category I is for measurements performed on circuits not directly connected to MAINS 1. This category includes signals such as voltages on a printed wire board (PWB) on the secondary of an isolation transformer.
- 2. Measurement Category II is for measurements performed on circuits directly connected to the low-voltage installation. This category refers to local-level distribution such as that provided by a standard wall outlet.
- 3. Measurement Category III is for measurements performed in the building installation. This category is a distribution level referring to hardwired equipment that does not rely on standard building insulation.
- 4. Measurement Category IV is for measurements performed at the source of the low-voltage (<1,000 V) installation.

mechanical	The number of switch cycles before the contact
life	resistance of a relay rises above 1Ω .

MOSFET Metal-Oxide-Semiconductor Field-Effect Transistor

mux synonym for multiplexer

multiplex To assign more than one signal to a channel.

multiplexer A topology in which you can connect one input to multiple

outputs or one output to multiple inputs.

Ν

NC normally closed

NO normally open

nonlatching A type of electromechanical relay with an initial position of relay normally closed maintained by the force of a spring or permanent magnet while no drive current flows.

Ρ

path	The route a signal follows through the switch from input terminal to output terminal.
path resistance	The resistance of a complete signal path from source to destination. This includes resistance of wiring, switching, and input and output connectors.
PCB	printed circuit board
PXI	PCI eXtensions for Instrumentation—A modular, computer- based instrumentation platform.
PXI Express	PCI Express eXtensions for Instrumentation—The PXI implementation of PCI Express, a scalable full-simplex serial bus standard that operates at 2.5 Gbps and offers both asynchronous and isochronous data transfers.
PXI Express- compatible module	A modified PXI module that is compatible with existing PXI chassis slots and PXI hybrid chassis slots. PXI Express- compatible modules preserve hardware and software compatibility, with the exception of local bus features.

R

Time required to charge a capacitor to 63.2 percent of its R-C time maximum voltage. constant reed relay A type of relay composed of two overlapping ferromagnetic blades hermetically sealed within a gas capsule that is filled with an inert gas. relay An electrically activated mechanical device that opens and closes electrical contacts. resistance The resistance to the flow of electric current. One ohm (Ω) is the resistance through which one volt of electric force causes one ampere to flow. RF radio frequency—Refers to frequencies below the infrared range. A switch capable of selecting one of many RF channels. RF multiplexer The time for a signal to transition from 10% to 90% of the rise time maximum signal amplitude.

S

scan	The process of cycling through a predefined scan list to when and how to make or break connections.
scan list	A string composed of channel names and characters that define connections, disconnections, triggering, and timing of the scan.
SCXI	Signal Conditioning eXtensions for Instrumentation. The National Instruments product line for conditioning low-level signals within an external chassis near sensors so that only high-level signals are sent to DAQ boards in the noisy PC environment. SCXI is an open standard available for all vendors.
Seebeck coefficients	Temperature coefficients of specific metal-to-metal junctions.
sense	The channel of a DMM used to measure the voltage drop across a resistance in a 4-wire measurement.
settling time	The time required for a signal to reach a steady state after sending an actuation command to the relay.
software trigger scanning	A type of scanning where the scan list advances at every call of niSwitch Send Software Trigger.
solid-state relay	A type of relay incorporating an LED to control the gate of a photo-sensitive MOSFET.
SPDT	single-pole double-throw
SPST	single-pole single-throw
SSR	solid-state relay
switch	A device for routing signals between two points.
switching capacity	The maximum current and voltage that a relay is specified to handle.
switching current	The maximum rated current that can flow through the switch as it makes or breaks a contact.
switching	The maximum signal voltage that the switch module can

voltage safely maintain.

synchronous A type of scanning where the scan list advances after the scanning witch receives a digital pulse from another device.

Т

- terminal Named location where a signal is either produced (generated) or consumed (acquired).
- terminal A group of several terminals, intended for interconnection of block circuits, mounted on a solid insulating block.
- thermal The voltage created by the junction of dissimilar metals that
- EMF increases and decreases with the rise and fall of the ambient temperature.
- topology Organizational representation of the channels and relays in a switch module.
- transistor A device used to amplify a signal or open and close a circuit.

V

- VA volt-ampere—A measurement of power. The volt-ampere rating is sometimes used if the rated equipment has significant phase shift between the current and voltage. Hence, the voltampere rating gives a power rating that ignores this phase shift.
- VI virtual instrument
- voltage the electromotive force

voltage The measure of signal reflection in a propagating signal. standing

wave

- ratio
- VSWR voltage standing wave ratio

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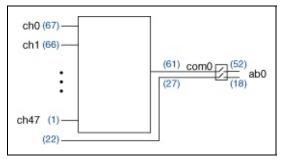
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NI PXI-2501/2503 1-Wire 48×1 Multiplexer Topology

When using the NI PXI-2501/2503 as a <u>1-wire</u> 48×1 <u>multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. The following figure is a representation of the NI PXI-2501/2503 in this mode.



Legend: Software Name (Hardware Name)

In 1-wire mode, all signals connected to the NI TB-2605 have the same reference. Connect this reference to screw terminal 27 on the NI TB-2605.

During <u>scanning</u>, a typical scan list entry is ch2->com0;. This entry routes the signal connected to ch2 (screw terminal 65) to COM0 (screw terminal 27).

During <u>immediate operations</u> when using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with ch2 and com0, the signal connected to ch2 (screw terminal 65) is routed to COM0 (screw terminal 27). To route the signals to ABO, use the niSwitch Connect Channels VI or the niSwitch_Connect function with com0 and ab0.

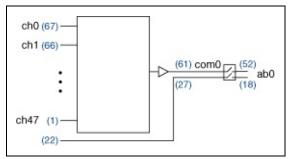
The following figure identifies the pins for the NI PXI-2501/2503 in the 1-wire 48×1 multiplexer topology.

CJS-1	34	68	CJS+1
CH24	33	67	CH0
CH25	32	66	CH1
CH26	31	65	CH2
CH27	30	64	CH3
CH28	29	63	CH4
CH29	28	62	CH5
COM0-	27	61	COM0+
COM1- (CH30-CH35)1	26	60	COM1+ (CH6-CH11)1
CH30	25	59	CH6
CH31	24	58	CH7
CH32	23	57	CH8
1_WIRE_LO_REF	22	56	GND
CH33	21	55	CH9
CH34	20	54	CH10
CH35	19	53	CH11
AB0-	18	52	ABO+
AB1-1	17	51	AB1+1
CH36	16	50	CH12
CH37	15	49	CH13
CH38	14	48	CH14
CH39	13	47	CH15
CH40	12	46	CH16
CH41	11	45	CH17
COM2- (CH36-CH41)1	10	44	COM2+ (CH12-CH17)1
COM3- (CH42-CH48)1	9	43	COM3+ (CH18-CH23)1
+5 V	8	42	SCAN_ADV
GND	7	41	EXT_TRIG_IN
CH42	6	40	CH18
CH43	5	39	CH19
CH44	4	38	CH20
CH45	3	37	CH21
CH46	2	36	CH22
CH47	1	35	CH23

¹not used in one-wire mode

NI PXI-2501 1-Wire 48×1 Amplified Multiplexer Topology

When using the NI PXI-2501 as a <u>1-wire</u> 48×1 <u>amplified</u> <u>multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. The following figure is a representation of the NI PXI-2501 in this mode.

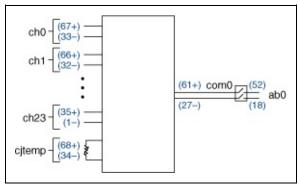


Legend: Software Name (Hardware Name)

The NI PXI-2501 in this topology operates the same way as the <u>1-wire</u> <u> 48×1 multiplexer topology</u> except that an amplifier, indicated in the figure above, can be used.

NI PXI-2501/2503 2-Wire 24×1 Multiplexer Topology

When using the NI PXI-2501/2503 as a <u>2-wire</u> 24×1 <u>multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. In this topology, you can connect to a <u>Cold-Junction Sensor Channel</u> for cold-junction compensation. The following figure is a representation of the NI PXI-2501/2503 in this mode.



Legend: Software Name (Hardware Name)

The NI PXI-2501/2503 in this topology contains 24 2-wire input channels connected to a common 2-wire channel. These input channels are referred to as ch<0..23> and the common channel is referred to as com0. All channels can connect to com0.

For example, you can connect ch5 to com0. When connecting signals for ch5, you would connect them to screw terminals 62 and 28 for HI and LO of the signal respectively. For com0, connect to screw terminals 61 and 27 for HI and LO of the signal, respectively.

You can also route cjtemp to com0, which routes com0 to a temperature sensor on the NI TB-2605 terminal block. Refer to <u>Cold-Junction Sensor</u> <u>Channel</u> for more information.

You can control the channels of the NI PXI-2501/2503 using the <u>niSwitch</u> <u>Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 5 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect functioning the **channel 1** parameter set to ch5 and the **channel 2** parameter set to com0. To connect channel 5 to ab0, make an additional call to the niSwitch Connect Channels VI or the niSwitch_Connect function to connect com1 to ab0.

When <u>scanning</u> the NI PXI-2501/2503, a typical scan list entry could be ch7->com0;. This entry routes the signal connected to ch7 to com0.

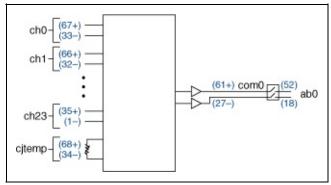
The following figure identifies the pins for the NI PXI-2501/2503 in the 2wire 24×1 multiplexer topology.

CJS0-	34	68	CJS0+
CH0-	33	67	CH0+
CH1-	32	66	CH1+
CH2-	31	65	CH2+
CH3-	30	64	CH3+
CH4-	29	63	CH4+
CH5-	28	62	CH5+
COM0-	27	61	COM0+
COM1-	26	60	COM1+
CH6-	25	59	CH6+
CH7-	24	58	CH7+
CH8-	23	57	CH8+
1_WIRE_LO_REF1	22	56	GND
CH9-	21	55	CH9+
CH10-	20	54	CH10+
CH11-	19	53	CH11+
AB0-	18	52	AB0+
AB1-	17	51	AB1+
CH12-	16	50	CH12+
CH13-	15	49	CH13+
CH14-	14	48	CH14+
CH15-	13	47	CH15+
CH16-	12	46	CH16+
CH17-	11	45	CH17+
COM2-	10	44	COM2+
COM3-	9	43	COM3+
+5 V	8	42	SCAN_ADV
GND	7	41	EXT_TRIG_IN
CH18-	6	40	CH18+
CH19-	5	39	CH19+
CH20-	4	38	CH20+
CH21-	3	37	CH21+
CH22-	2	36	CH22+
CH23-	1	35	CH23+
and the second second			

¹not used in two-wire mode

NI PXI-2501 2-Wire 24×1 Amplified Multiplexer Topology

When using the NI PXI-2501 as a <u>2-wire</u> 24×1 <u>amplified multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. In this topology, you can connect to a <u>cold-junction sensor channel</u> for cold-junction compensation. The following figure is a representation of the NI PXI-2501 in this mode.

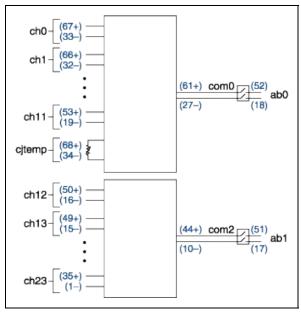


Legend: Software Name (Hardware Name)

The NI PXI-2501 in this topology operates the same way as the 2-wire 24×1 multiplexer topology except that an amplifier, indicated in the figure above, can be used.

NI PXI-2501/2503 2-Wire Dual 12×1 Multiplexer Topology

When using the NI PXI-2501/2503 as a <u>2-wire</u> dual 12×1 <u>multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. In this topology, you can connect to a <u>Cold-Junction Sensor Channel</u> for cold-junction compensation. The following figure is a representation of the NI PXI-2501/2503 in this mode.



Legend: Software Name (Hardware Name)

The NI PXI-2501/2503 in this topology contains two banks of 12 2-wire input channels connected to a common 2-wire channel. These input channels are referred to as ch<0..23> and the two common channels are referred to as com0 and com2. You can only connect to the common channel that is in the same bank. The banks are organized as follows:

Input Channels	Common Channel
ch0, ch1, ch2, ch3, ch4, ch5, ch6, ch7, ch8, ch9, ch10, ch11, cjtemp	com0
ch12, ch13, ch14, ch15, ch16, ch17, ch18, ch19, ch20, ch21, ch22, ch23	com2

For example, you can connect ch5 to com0; however, you cannot connect ch5 to com2 in this topology. When connecting signals for ch5, you would connect them to screw terminals 62 and 28 for HI and LO of the signal, respectively. For com0, connect to screw terminals 61 and 27 for HI and LO of the signal, respectively.

Notice that in the first bank you can connect citemp to com0. This connects com0 to a temperature sensor on the NI TB-2605 terminal block. Refer to <u>Cold-Junction Sensor Channel</u> for more information.

You can connect the channels of the NI PXI-2501/2503 using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function. For example, to connect channel 5 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect functioning the **channel 1** parameter set to ch5 and the **channel 2** parameter set to com0. To connect channel 5 to ab0, make an additional call to the niSwitch Connect Channels VI or the niSwitch_Connect function to connect com1 to ab0.

When <u>scanning</u> the NI PXI-2501/2503, a typical scan list entry could be ch5->com0;. This entry routes the signal connected to ch5 to com0.

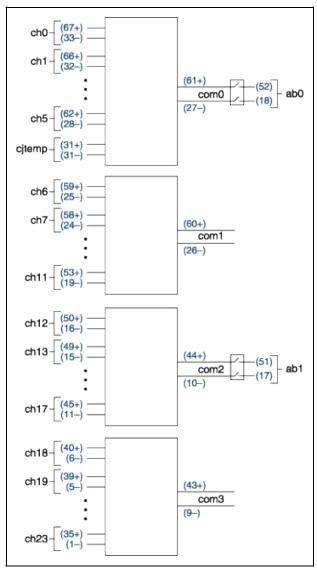
The following figure identifies the pins for the NI PXI-2501/2503 in the 2wire dual 12×1 multiplexer topology.

CJS0-	34	68	CJS0+
CH0-	33	67	CH0+
CH1-	32	66	CH1+
CH2-	31	65	CH2+
CH3-	30	64	CH3+
CH4-	29	63	CH4+
CH5-	28	62	CH5+
COM0-	27	61	COM0+
COM1-	26	60	COM1+
CH6-	25	59	CH6+
CH7-	24	58	CH7+
CH8-	23	57	CH8+
1_WIRE_LO_REF1	22	56	GND
CH9-	21	55	CH9+
CH10-	20	54	CH10+
CH11-	19	53	CH11+
AB0-	18	52	AB0+
AB1-	17	51	AB1+
CH12-	16	50	CH12+
CH13-	15	49	CH13+
CH14-	14	48	CH14+
CH15-	13	47	CH15+
CH16-	12	46	CH16+
CH17-	11	45	CH17+
COM2-	10	44	COM2+
COM3-	9	43	COM3+
+5 V	8	42	SCAN_ADV
GND	7	41	EXT_TRIG_IN
CH18-	6	40	CH18+
CH19-	5	39	CH19+
CH20-	4	38	CH20+
CH21-	3	37	CH21+
CH22-	2	36	CH22+
CH23-	1	35	CH23+

¹not used in two-wire mode

NI PXI-2501/2503 2-Wire Quad 6×1 Multiplexer Topology

When using the NI PXI-2501/2503 as a <u>2-wire</u> quad 6×1 <u>multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. In this topology, you can connect to a <u>Cold-Junction Sensor Channel</u> for cold-junction compensation. The following figure is a representation of the NI PXI-2501/2503 in this mode.



Legend: Software Name (Hardware Name)

The NI PXI-2501/2503 in this topology contains four banks of six 2-wire input channels connected to a common 2-wire channel. These input channels are referred to as ch<0..23>, and the four common channels are referred to as com<0..3>. You can only connect to the common channel that is in the same bank. The banks are organized as follow:

Input Channels	Common Channel
ch0, ch1, ch2, ch3, ch4, ch5, cjtemp	com0
ch6, ch7, ch8, ch9, ch10, ch11	com1
ch12, ch13, ch14, ch15, ch16, ch17	com2
ch18, ch19, ch20, ch21, ch22, ch23	com3

For example, you can connect ch5 to com0; however, you cannot connect ch5 to com1 in this topology. When connecting signals for ch5, you would connect them to screw terminals 62 and 28 for HI and LO of the signal, respectively. For com0, connect to screw terminals 61 and 27 for HI and LO of the signal, respectively.

Notice that in the first bank you can connect cjtemp to com0. This connects com0 to a temperature sensor on the NI TB-2605 terminal block. Refer to <u>Cold-Junction Sensor Channel</u> for more information.

You can connect the channels of the NI PXI-2501/2503 using the <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function. For example, to connect channel 5 to common 0, call the niSwitch Connect Channels VI or the niSwitch_Connect functioning the **channel 1** parameter set to ch5 and the **channel 2** parameter set to com0. To connect channel 5 to ab0, make an additional call to the niSwitch Connect Channels VI or the niSwitch_Connect function to connect com1 to ab0.

When <u>scanning</u> PXI-2501/2503, a typical scan list entry could be ch7->com1;. This entry routes the signal connected to ch7 to com1.

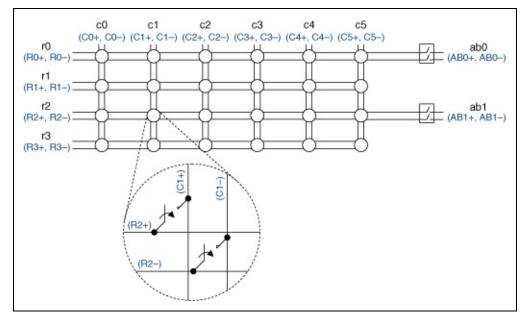
The following figure identifies the pins for the NI PXI-2501/2503 in the 2wire quad 6×1 multiplexer topology.

CJS0-	34	68	CJS0+
CH0-	33	67	CH0+
CH1-	32	66	CH1+
CH2-	31	65	CH2+
CH3-	30	64	CH3+
CH4-	29	63	CH4+
CH5-	28	62	CH5+
COM0-	27	61	COM0+
COM1-	26	60	COM1+
CH6-	25	59	CH6+
CH7-	24	58	CH7+
CH8-	23	57	CH8+
1_WIRE_LO_REF1	22	56	GND
CH9-	21	55	CH9+
CH10-	20	54	CH10+
CH11-	19	53	CH11+
AB0-	18	52	AB0+
AB1-	17	51	AB1+
CH12-	16	50	CH12+
CH13-	15	49	CH13+
CH14-	14	48	CH14+
CH15-	13	47	CH15+
CH16-	12	46	CH16+
CH17-	11	45	CH17+
COM2-	10	44	COM2+
COM3-	9	43	COM3+
+5 V	8	42	SCAN_ADV
GND	7	41	EXT_TRIG_IN
CH18-	6	40	CH18+
CH19-	5	39	CH19+
CH20-	4	38	CH20+
CH21-	3	37	CH21+
CH22-	2	36	CH22+
CH23-	1	35	CH23+

¹not used in two-wire mode

NI PXI-2501/2503 2-Wire 4×6 Matrix Topology

When using the NI PXI-2501/2503 as a 2-wire 4×6 matrix, connect your signals using the NI TB-2606 terminal block. The following figure is a representation of the NI PXI-2501/2503 in this mode.



Legend: Software Name (Hardware Name)

In this topology, connect your positive and negative leads to $Cx\pm$ or $Rx\pm$ inside the NI TB-2606 terminal block.

During immediate operations when you use the <u>niSwitch Connect</u> <u>Channels</u> VI or the <u>niSwitch_Connect</u> function with c0 and r0, the signal connected to C0 \pm is routed to R0 \pm . To route R0 \pm to AB0 \pm , use the niSwitch Connect Channels VI or the niSwitch_Connect function with r0 and ab0.

Terminal Block Connections

The NI TB-2606 terminal block creates the following connections to operate the NI PXI-2501/2503 as a 2-wire 4×6 matrix topology. Refer to the pinout for pin locations.

The following table lists the pins the NI TB-2606 shorts and the column connections created.

Connections	Pins	Connections	Pins	Connections	I
C0+	67,59,50,40	C2+	65,57,48,38	C4+	63,5
C0-	33,25,16,6	C2-	31,23,14,4	C4-	29,:
C1+	66,58,49,39	C3+	64,55,47,37	C5+	62,5
C1-	32,24,15,5	C3-	30,21,13,3	C5-	28,

The following table lists the pins and their associated row connection.

Connections	Pins	Connections	Pins	Connections	Pins	Connection
R0+	61	R1+	60	R2+	44	R3+
R0-	27	R1-	26	R2-	10	R3-

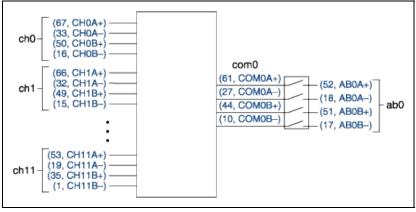
The following figure identifies the pins for the NI PXI-2501/2503 in the 2-wire 4×6 matrix topology.

CJS-1	34	68	CJS+1
COLO-	33	67	COL0+
COL1-	32	66	COL1+
COL2-	31	65	COL2+
COL3-	30	64	COL3+
COL4-	29	63	COL4+
COL5-	28	62	COL5+
ROW0-	27	61	ROW0+
ROW1-	26	60	ROW1+
COL0-	25	59	COL0+
COL1-	24	58	COL1+
COL2-	23	57	COL2+
1_WIRE_LO_REF1	22	56	GND
COL3-	21	55	COL3+
COL4-	20	54	COL4+
COL5-	19	53	COL5+
AB0- (ROW0-)	18	52	AB0+ (ROW0+)
AB1- (ROW2-)	17	51	AB1+ (ROW2+)
COL0-	16	50	COL0+
COL1-	15	49	COL1+
COL2-	14	48	COL2+
COL3-	13	47	COL3+
COL4-	12	46	COL4+
COL5-	11	45	COL5+
ROW2-	10	44	ROW2+
ROW3-	9	43	ROW3+
+5 V	8	42	SCAN_ADV
GND	7	41	EXT_TRIG_IN
COL0-	6	40	COL0+
COL1-	5	39	COL1+
COL2-	4	38	COL2+
COL3-	3	37	COL3+
COL4-	2	36	COL4+
COL5-	1	35	COL5+

¹not used in matrix mode

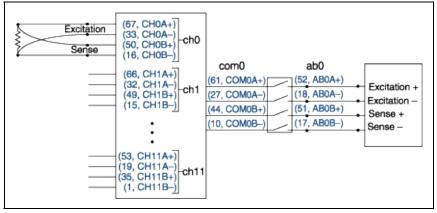
NI PXI-2501/2503 4-Wire 12×1 Multiplexer Topology

When using the NI PXI-2501/2503 as a <u>4-wire</u> 12×1 <u>multiplexer</u>, connect your signals using the <u>NI TB-2605</u> terminal block. The following figure is a representation of the NI PXI-2501/2503 in this mode.



Legend: Software Name (Hardware Name)

4-wire mode is usually used in 4-wire resistance measurements. One pair of wires supplies the excitation current while the other pair makes the voltage measurement. In 4-wire mode, connect your excitation or source leads to CHxA+ and CHxA-, and connect your measurement or sensing leads to CHxB+ and CHxB-, as shown in the following figure:



Legend: Software Name (Hardware Name)

Note The previous figure shows the DMM connected to the analog bus (AB) of the switch module. Instead of routing signals to the AB, you can connect COM0A+ and COM0A- to the excitation terminals and COM0B+ and COM0B- to the sense terminals of the DMM.

During scanning, a typical scan list entry is ch2->com0;. This entry routes the excitation signals from CH2A+ and CH2A- to COM0A+ and COM0A-, respectively. This entry also routes the sensing lead from CH2B+ and CH2B- to COM0B+ and COM0B+, respectively.

During immediate operations when using niSwitch Connect Channels with ch2 and com0, the excitation signals are routed from CH2A+ and CH2A- to COM0A+ and COM0A-, respectively. This call also routes the sensing lead from CH2B+ and CH2B- to COM0B+ and COM0B+, respectively. To route AB0A± and AB0B± to CH2A± and CH2B±, respectively, call niSwitch Connect Channels with com0 and ab0.

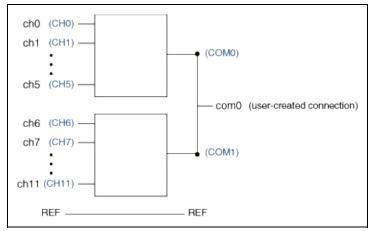
The following figure identifies the pins for the NI PXI-2501/2503 in the 4-wire 12×1 multiplexer topology.

CJS-1	34	68	CJS+1
CH0A-	33	67	CH0A+
CH1A-	32	66	CH1A+
CH2A-	31	65	CH2A+
CH3A-	30	64	CH3A+
CH4A-	29	63	CH4A+
CH5A-	28	62	CH5A+
COM0A-	27	61	COM0A+
COM1A-	26	60	COM1A+
CH6A-	25	59	CH6A+
CH7A-	24	58	CH7A+
CH8A-	23	57	CH8A+
1_WIRE_LO_REF1	22	56	GND
CH9A-	21	55	CH9A+
CH10A-	20	54	CH10A+
CH11A-	19	53	CH11A+
AB0A-	18	52	AB0A+
AB0B-	17	51	AB0B+
CH0B-	16	50	CH0B+
CH1B-	15	49	CH1B+
CH2B-	14	48	CH2B+
CH3B-	13	47	CH3B+
CH4B-	12	46	CH4B+
CH5B-	11	45	CH5B+
COM0B-	10	44	COM0B+
COM1B-	9	43	COM1B+
+5 V	8	42	SCAN_ADV
GND	7	41	EXT_TRIG_IN
CH6B-	6	40	CH6B+
CH7B-	5	39	CH7B+
CH8B-	4	38	CH8B+
CH9B-	3	37	CH9B+
CH10B-	2	36	CH10B+
CH11B-	1	35	CH11B+

¹not used in four-wire mode

NI PXI-2584 1-Wire 12×1 Multiplexer Topology

Install an external jumper wire between the COM0 and COM1 pins to use the NI PXI-2584 as a <u>1-wire</u> 12×1 <u>multiplexer</u>. The following figure represents the NI PXI-2584 1-wire 12×1 multiplexer topology.



Legend: Software Name (Hardware Name)

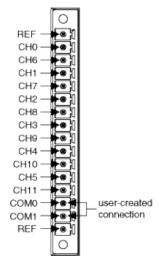
Both the scanning command, ch2->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch_Connect</u> function with parameters ch2 and com0, result in the following connection:

Signal connected to CH2 is routed to COM0.

Both the scanning command, ch7->com0;, and the immediate operation, <u>niSwitch Connect Channels</u> VI or the <u>niSwitch Connect</u> function with parameters ch7 and com0, result in the following connection:

Signal connected to CH7 is routed to COM1.

The following figure identifies the pins for the NI PXI-2584 in the 1-wire 12×1 multiplexer topology.



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