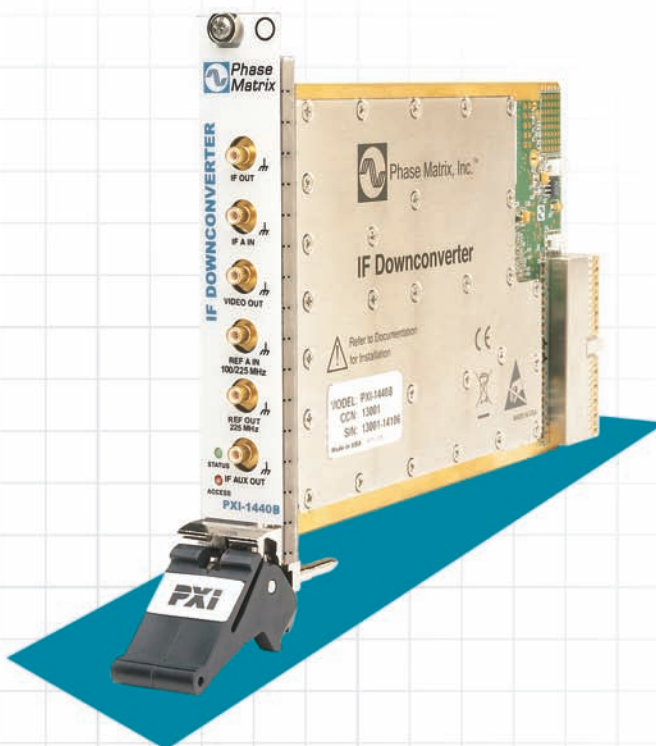




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# PXI MICROWAVE *IF DOWNCONVERTER MODULE*

Model PXI-1440B



## Quick Start Guide

PXI-1440B CCN 14601  
Manual Assy Part Number 5585514-01  
Manual Text Part Number 5580514-01 Rev B

# Notices

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### CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

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## **Introducing the PXI-1440B IF Downconverter Module**

Congratulations on purchasing a  
Phase Matrix PXI-1440B IF Downconverter Module!

To get the most out of your purchase, it is recommended that this  
[\*Quick Start Guide\*](#) be read carefully and completely.

### **In this document...**

The scope of this document is to describe the installation process of the stand-alone hardware and software for the PXI-1440B and to confirm basic module operation.

This document describes information for the PXI-1440B when used in a PXI system with an embedded controller or a PXI remote controller.

[“Step 1. Confirm Module Operating Requirements” on page 4](#)

[“Step 2. Perform Hardware Installation/Configuration” on page 5](#)

[“Step 3. Perform Software Installation/Configuration” on page 9](#)

[“Step 4. Review Hardware and Software Front Panels” on page 19](#)

[“Step 5. Confirm Basic Module Operation \(MASTER\)” on page 29](#)

[“Step 6. Confirm Basic Module Operation \(SLAVE\)” on page 33](#)

## Step 1. Confirm Module Operating Requirements

**Table 1** Module Operating Requirements When Used in a PXI System

---

### Operating System

- Windows 7 (32- and 64-bit versions)
- Windows XP (32-bit version)
- LabVIEW Real-Time (Version 8.2.1 and later)

**BIOS** - computers manufactured prior to 2008 require *NI MXI-Express BIOS Compatibility Software*.

This BIOS software is available on the Internet at: [NI > Support > Drivers and Software > MXI-Express BIOS Compatibility Software - Windows 7 x86/XP](#)

**RAM** - minimum of 256 MB required by LabVIEW.

**CD Drive** - used to install PXI device driver software and Soft Front Panel from an optional CD

PXI device driver software and Soft Front Panels are available from an optional CD or from the Phase Matrix web site at: [www.phasematrix.com](http://www.phasematrix.com)

**Screen Resolution** - at least 1024 × 768 pixels, recommended.

**Adobe Reader** - 6.0.1 or later to view or search PDF versions of manuals.

**Interface/Controller** - select either an embedded controller or a PXI remote controller.

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#### Embedded Controller

NI PXI-8106 2.16 GHz Dual-Core PXI Embedded Controller  
or NI PXIe-8106 2.16 GHz Dual-Core PXI Express Embedded Controller  
or equivalent embedded controller running Windows 7/XP

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#### PXI Remote Controller

NI PXI-CardBus8310 Laptop Control of PXI with PCMCIA CardBus  
or NI PXIe-ExpressCard8360 Laptop Control of PXI Express with ExpressCard  
or equivalent PXI remote controller running Windows 7/XP

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### NOTE

LabVIEW does not support Windows NT/Me/98/95, any of the Windows Server editions, or Windows XP x64.

LabVIEW does support Windows 7 (64-bit version).

LabVIEW or the LabVIEW Run-Time Engine does support Windows 2000 with Service Pack 3 or later.

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## Step 2. Perform Hardware Installation/Configuration

### CAUTION

PXI hardware does not support “hot-swap” capabilities!

Before installing the PXI-1440B IF Downconverter Module, the PXI chassis must be powered off and unplugged to prevent damage to PXI modules.

**3**

The PXI-1440B can be installed in any standard-PXI slot marked with a peripheral slot compatibility image (a circle containing the slot number).

**7**

The PXI-1440B can also be installed in any hybrid-PXI slot marked with a peripheral slot compatibility image (the letter “H” and a solid circle containing the slot number).

**Do not install** the PXI-1440B into a slot for PXI Express (PXIe) modules.

### NOTE

A PXI-1440B can be used in either a PXI or PXIe chassis, with either a PXI or PXIe interface/controller, but the PXI-1440B must only be installed into a standard-PXI slot or a hybrid-PXI slot.

### Step 2-1. Unpack Hardware

Each PXI-1440B ships in an antistatic package to prevent damage from electrostatic discharge (ESD). Because ESD can damage several components of a hardware module, store all modules in antistatic envelopes when not in use.

### CAUTION

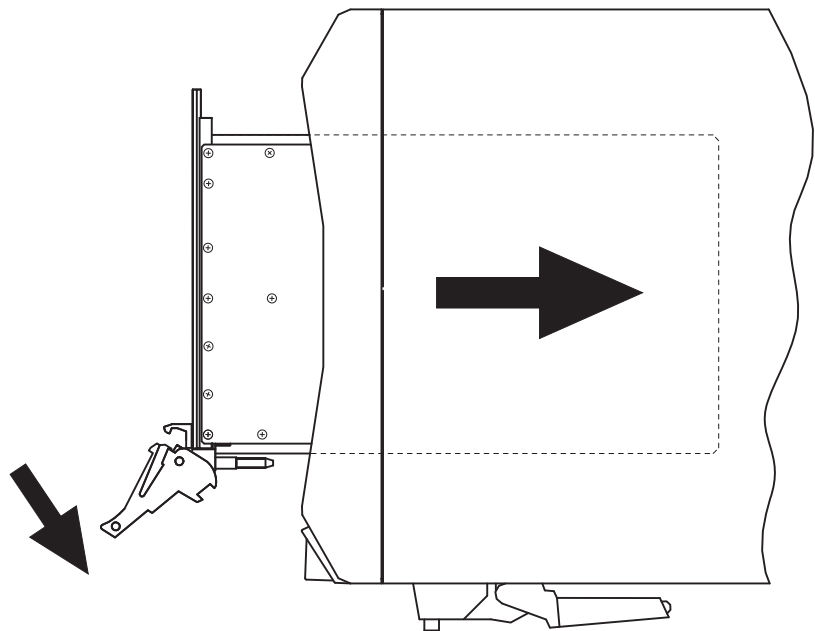
- To avoid damage when handling a module, do not touch exposed connector pins.
- Before touching or handling a module, use a grounding strap or touch a grounded object to ground yourself.
- Before touching or removing a module from its package, touch the antistatic package to a metal part of your computer chassis.
- Remove each module from its package and inspect it for loose components or any signs of damage. Notify Phase Matrix if any module appears damaged in any way.
- Do not install damaged modules into a system.

Unpack the contents of the box and verify that everything is included:

- PXI-1440B IF Downconverter Module
- Optional CD (included if specifically ordered; otherwise, PXI device driver software and Soft Front Panels are available from the Phase Matrix web site at: [www.phasematrix.com](http://www.phasematrix.com)).

## Step 2-2. Install PXI Modules into a PXI Chassis

**Figure 1** Install PXI Modules into a PXI Chassis



Phase Matrix PXI modules are sensitive instruments that should be handled carefully. Do not expose modules to temperatures or humidity beyond their rated maximums.

### CAUTION

- For information about the rated maximums, refer to each module's specifications document available at: [www.phasematrix.com](http://www.phasematrix.com)
- Keep the module free of dust by cleaning only with compressed air.
- Do not clean the module with any solvents or liquids.
- To prevent damage to the module caused by ESD or contamination, handle the module using the edges or the metal bracket.

- 1 Assure that the power switch is in the Off (Standby) position and unplug the PXI chassis.
- 2 If the chassis has multiple fan speed settings, ensure that the fans are set to automatic. Do not set the fan speed to low or turn it off.
- 3 Position the chassis so that there is ample space between the chassis fan intake and exhaust vents. Blockage by walls or obstructions affects the air flow needed for cooling. (Refer to the chassis documentation for more information about cooling.)
- 4 Holding the PXI-1440B by the injector/ejector handle, slide it into an available PXI (or hybrid) slot, as shown in [Figure 1](#).
  - a Install the PXI-1440B into the PXI (or hybrid) slot of the chassis by placing the module card edges into the front module guides (top and bottom).
  - b Slide the PXI-1440B to the rear of the chassis and assure that the injector/ejector handle is pushed down in the unlatched (downward) position.
  - c Slide the module completely into the chassis. When you begin to feel resistance, push up on the injector/ejector handle to fully inject the module into the chassis frame.
- 5 Latch the PXI-1440B by pulling up on the injector/ejector handle and secure the module front panel to the chassis using the module front-panel mounting screws.
- 6 Tighten the screws on the PXI-1440B front panel. Performance may suffer if the screws are not tightened properly.
- 7 Verify that the PXI chassis fans are operable and free of dust and other contaminants that may restrict airflow.
- 8 Install all chassis covers and filler panels after installing the PXI-1440B. Missing filler panels disrupt necessary air circulation in the chassis.

**NOTE**

Phase Matrix recommends installing slot blockers in adjacent vacant PXI slots to maximize cooling air flow to the PXI modules.

A PXI Chassis Slot Blocker Kit (National Instruments part number 778678-01) is available for purchase at [www.ni.com](http://www.ni.com).

- 9 Plug-in and power-on the PXI chassis.

## Step 2-3. Connect to the Host Computer and Power Source

### Embedded Controller

- 1 Connect the keyboard, mouse, monitor and any other external devices to the PXI embedded controller.
- 2 Connect the chassis' AC or DC inlet to the power source using an appropriate power cable.
- 3 When the power switch is in the ON position, observe that fans become operational.
- 4 If the power outlet does not have an appropriate ground connection, connect the premise safety ground to the chassis grounding screw. Refer to the chassis' user manual at [ni.com/manual](http://ni.com/manual) for instructions.

*PXI systems can be controlled from a PC or laptop computer through a software transparent link using National Instruments' PXI Remote Controllers.*

*- **PC control** of PXI consists of a PCI/PCI Express board in the computer and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper or fiber-optic cable.*

*- **Laptop computer control** of PXI consists of an ExpressCard/PCMCIA CardBus card in the laptop and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper cable.*

### PXI Remote Controller

- 1 Install the PCI/PCI Express board in a PC or insert the ExpressCard/PCMCIA CardBus card in a laptop computer.
- 2 Connect the chassis' AC or DC inlet to the power source using an appropriate power cable.
- 3 When the power switch is in the ON position, observe that fans become operational.
- 4 If the power outlet does not have an appropriate ground connection, connect the premise safety ground to the chassis grounding screw. Refer to the chassis' user manual at [ni.com/manual](http://ni.com/manual) for instructions.

## (Step 2-4. Optional) Uninstall PXI Modules

Before uninstalling PXI modules, power off the PXI chassis!

When removing PXI modules from a chassis, ensure that you are grounded with a grounding strap or are touching a grounded metal surface. To avoid ESD, do not touch the exposed connector pins or any exposed circuitry on the device. When not in use, PXI modules should be stored in the original antistatic envelope to avoid damage.





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## Step 3. Perform Software Installation/Configuration

Complete the following steps to install the PXI device driver software and Soft Front Panels available from an optional CD or from the Phase Matrix web site at: [www.phasematrix.com](http://www.phasematrix.com)

### NOTE

Any application development environment (ADE) that is to be used (such as LabVIEW, LabWindows/CVI, or a third-party program) must be installed prior to installing the PXI device driver software or its Soft Front Panel.

### Embedded Controller

- 1 Install the PXI device driver from an optional CD or from the Phase Matrix web site.  
See “[Step 3-1. Installing the PXI Device Driver](#)” on page 10.
- 2 Install the Soft Front Panel from an optional CD or from the Phase Matrix web site.  
See “[Step 3-2. Installing the Soft Front Panel](#)” on page 13.

### PXI Remote Controller

*PXI systems can be controlled from a PC or laptop computer through a software transparent link using National Instruments’ PXI Remote Controllers.*

**- PC control** of PXI consists of a PCI/PCI Express board in the computer and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper or fiber-optic cable.

**- Laptop computer control** of PXI consists of an ExpressCard/PCMCIA CardBus card in the laptop and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper cable.

- 1 If the PXI remote controller (PC or laptop computer) being used is a Windows based operating system and was manufactured prior to 2008, install *NI MXI-Express BIOS Compatibility Software*:  
[NI MXI-Express BIOS Compatibility Software](#)
- 2 Install the *NI PXI Platform Services Software* that accompanies the PXI remote controller: [NI PXI Platform Services Software](#)
- 3 Install the PXI device driver from an optional CD or from the Phase Matrix web site.  
See “[Step 3-1. Installing the PXI Device Driver](#)” on page 10.
- 4 Install the Soft Front Panel from an optional CD or from the Phase Matrix web site.  
See “[Step 3-2. Installing the Soft Front Panel](#)” on page 13.
- 5 Connect the PXI remote controller, using the manufacture’s provided cable, to the expansion card in the PXI remote controller.
- 6 Reboot the PXI remote controller.

## Step 3-1. Installing the PXI Device Driver

This procedure is used to install the PXI-1440B's device driver using the "Found New Hardware Wizard" on an embedded controller or a PXI remote controller running Windows 7/XP.

### NOTE

If the embedded controller or the PXI remote controller being used has previously had a device driver of the same type installed, it must be removed before installing a new PXI-1440B's device driver.

Refer to "(Step 3-3. Optional) Uninstalling the PXI Device Driver" on page 17 for further details.

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### NOTE

Any application development environment (ADE) that is to be used (such as LabVIEW, LabWindows/CVI, or a third-party program) must be installed prior to installing the PXI device driver software or its Soft Front Panel.

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### NOTE

The following procedure is shown for systems running Windows 7 and may vary slightly for systems running Windows XP.

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### NOTE

Anti-virus software may prevent the device driver installer from executing.

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#### 1 Install PXI device drivers using one of the following methods:

- Insert the optional CD containing the device driver.
- Download the latest available PXI device driver from the Phase Matrix web site and unzip it to a location on the embedded controller or the PXI remote controller.

Device drivers are available at: [www.phasematrix.com](http://www.phasematrix.com)

### CAUTION

PXI hardware does not support "hot-swap" capabilities!

Before installing the PXI-1440B IF Downconverter Module, the PXI chassis must be powered off and unplugged to prevent damage to PXI modules.

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#### 2 Install PXI modules into the PXI chassis and turn on power.

- 3 Launch the PXI-14XX Series Device Driver Installer, “PXI-14XX Driver (32 bit).exe” or “PXI-14XX Driver (64 bit).exe.”

The PXI-14XX Series Devcie Driver Installer will open with a welcome window similar to the one shown in [Figure 2](#).

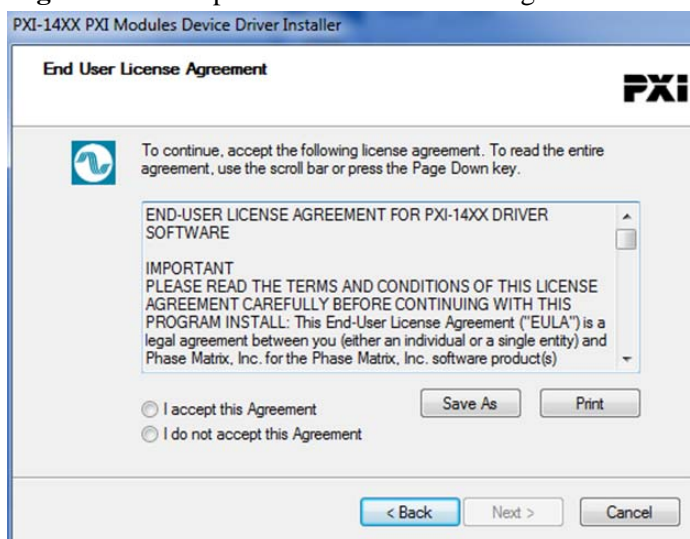
**Figure 2** Example Welcome Window



- 4 Select **Next** to continue.

Windows will display the End User License Agreement (EULA) as shown in [Figure 3](#).

**Figure 3** Example of Software License Agreement

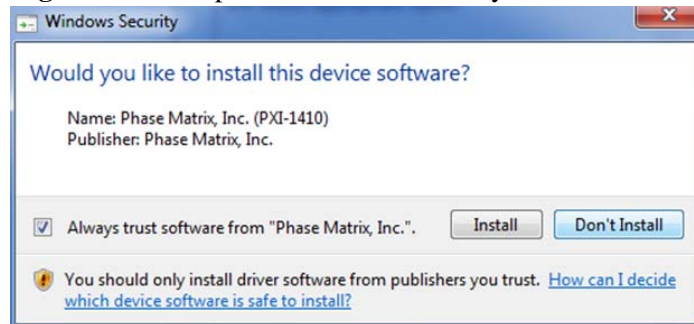


5 Carefully read through the EULA.

- If you accept the terms of the EULA, select “I accept this Agreement” and Select **Next** to continue.
- If you do not accept the agreement, you will not be able to install the software.

A Windows security window similar to the one shown in Figure 4 will appear.

**Figure 4** Example of Windows Security Window



6 Select **Install** to continue.

Windows should display a message indicating that the installation was successful.

**Figure 5** Example of Completing the Installer



7 Select **Finish** to complete the device driver installation.

## Step 3-2. Installing the Soft Front Panel

This procedure is used to install the PXI-1440B's Soft Front Panel graphical user interface on an embedded controller or a PXI remote controller running Windows 7/XP.

**NOTE**

The device driver software must be installed before this Soft Front Panel can be used to control the PXI-1440B.

Refer to “[Step 3-1. Installing the PXI Device Driver](#)” on page 10 for further details.

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**NOTE**

Any application development environment (ADE) that is to be used (such as LabVIEW, LabWindows/CVI, or a third-party program) must be installed prior to installing the PXI device driver software or its Soft Front Panel.

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**NOTE**

The following procedure is shown for systems running Windows XP and may vary slightly for systems running Windows 7.

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**1** Install the Soft Front Panel using one of the following methods:

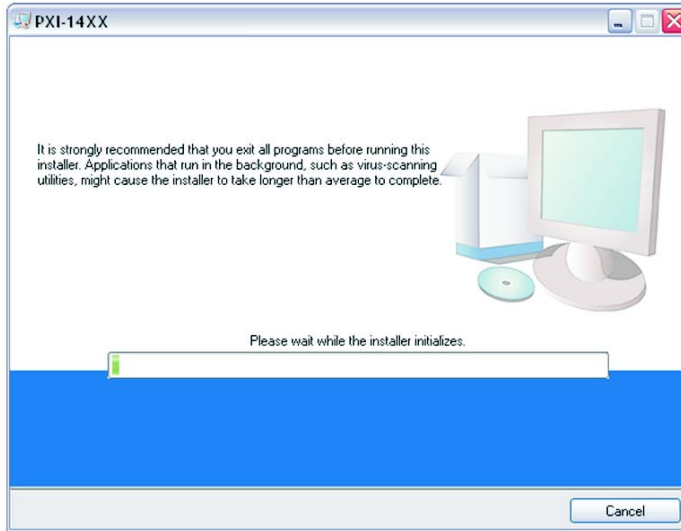
- Insert the optional CD containing the Soft Front Panel.
- Download the latest available Soft Front Panel from the Phase Matrix web site and unzip it to a location on the embedded controller or the PXI remote controller.

Soft Front Panels are available at: [www.phasematrix.com](http://www.phasematrix.com)

**2** Start the installation process by selecting **Start > Run > Browse**, navigate to the "setup.exe" file and select **Open** to start the installation wizard.

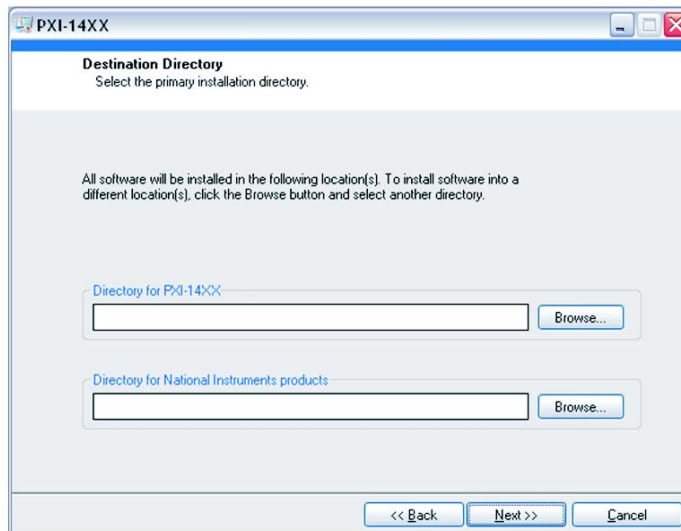
After a small delay, a screen similar to [Figure 6](#) is displayed. The actual screen that appears will have the label of the module Soft Front Panel being installed, so instead of “PXI-14XX,” the label is displayed as either “PXI-1410,” “PXI-1420,” “PXI-1430B,” “PXI-1440B,” or “PXI-1450B.”

**Figure 6** Example of Starting the Soft Front Panel Installation Wizard

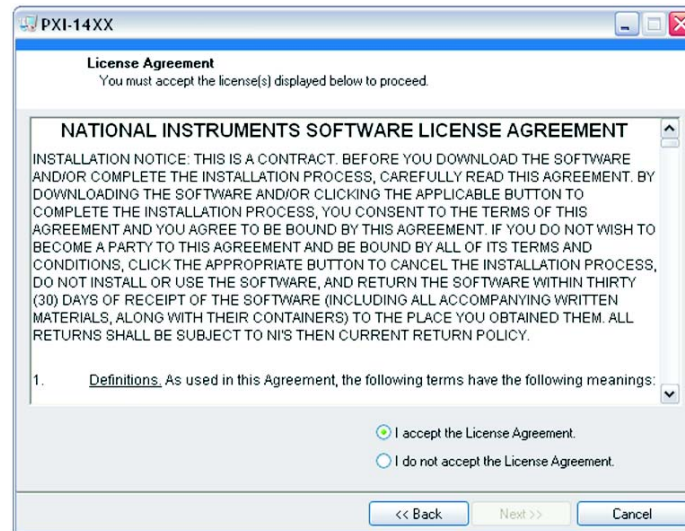


- 3 Continue to the next screen.

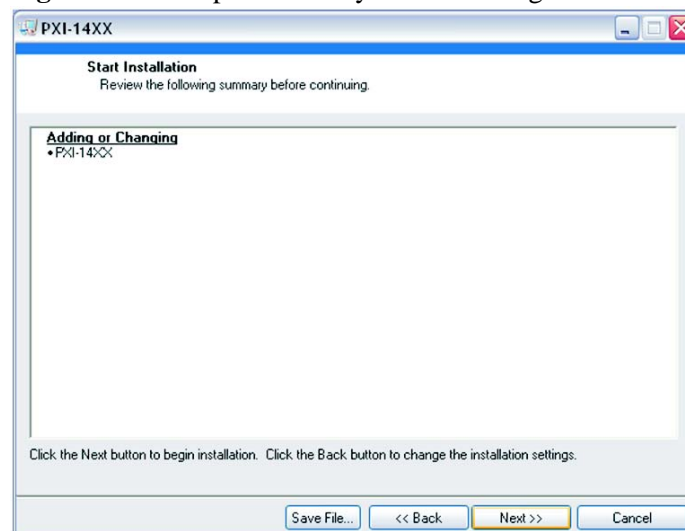
**Figure 7** Example of Selecting Destination Directory for Executables



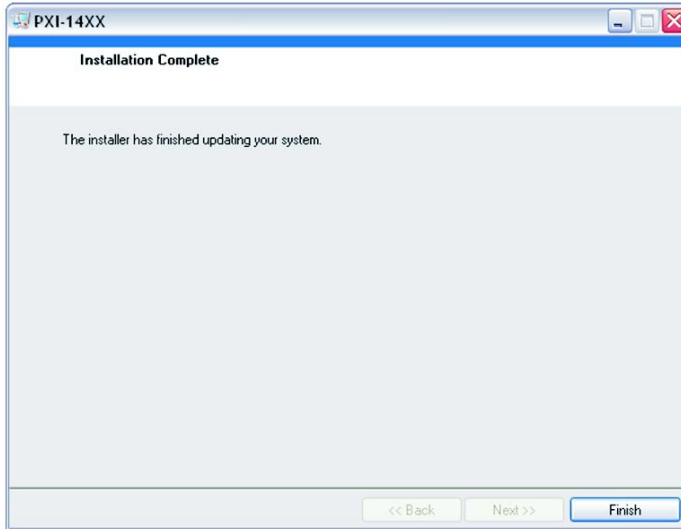
- 4 Enter the destination directory for the PXI-1440B's Soft Front Panel executables or browse to a destination directory by selecting the **Browse** button.
- 5 Once the file path has been entered, select **Next** to continue to the Software License Agreement.

**Figure 8** Example Software License Agreement**6** Carefully read through the Software License Agreement.

- If you agree to the terms of the software license agreement, select "I accept the License Agreement" and select **Next** to continue.
- If you do not agree, you will not be able to install the software.

**Figure 9** Example Summary of Files Being Installed**7** Review the list of files to be installed and select **Next** to begin the installation.

**Figure 10** Example of Completing Soft Front Panel Installation Wizard



- 8 Select **Finish** to complete the Soft Front Panel installation.



### (Step 3-3. Optional) Uninstalling the PXI Device Driver

This procedure is used to uninstall previous versions of the PXI-1440B's device driver from an embedded controller or a PXI remote controller running Windows 7/XP.

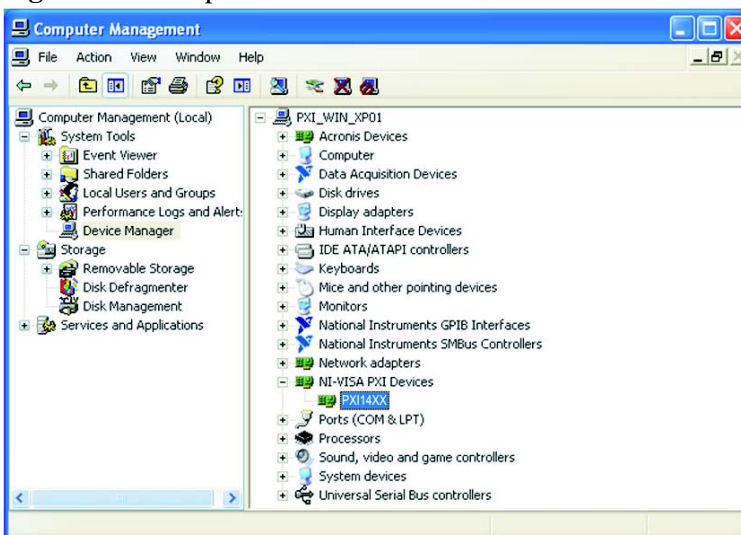
#### NOTE

- If this is the first time that a PXI-1440B's device driver is being installed, this procedure is optional and can be skipped.
- If the embedded controller or the PXI remote controller has previously had a device driver of the same type installed, it must be removed before installing a new PXI-1440B's device driver.

#### NOTE

The following procedure is shown for systems running Windows XP and may vary slightly for systems running Windows 7.

**Figure 11** Example of Device PX14XX Under "NI-VISA PXI Devices"



- 1 Open the Device Manager by selecting **Start > Control Panel > Performance and Maintenance > System**.
- 2 Select the **Hardware** tab and select **Device Manager**.
- 3 Select the **View** pull-down menu.
- 4 Select **Devices by connection** and the device should appear under "NI-VISA PXI Devices" with the label as "PM14XX."\*

\* PM14XX will actually display as PXI-1440B IF Downconverter Module.

- 5 To uninstall the device driver for a selected module, right-click on the selected device and a popup menu is displayed with five selectable choices.
- 6 Select **Uninstall** and a popup window is displayed with a conformation to continue with the uninstall process.

**Figure 12** Example of Confirming Device Driver Removal

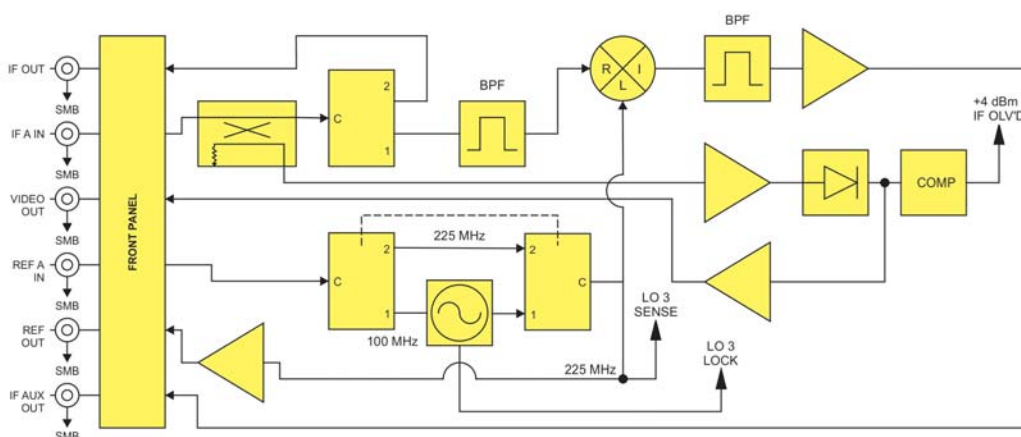
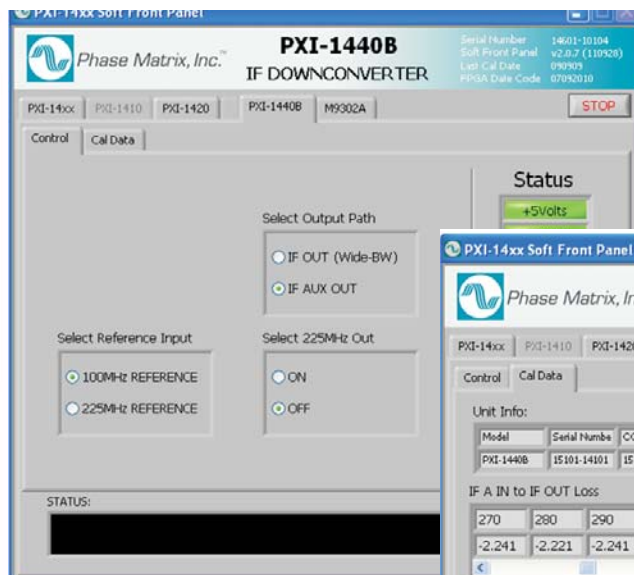


- 7 Select **OK** to confirm the prompt and uninstall the device driver.



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## Step 4. Review Hardware and Software Front Panels



## Hardware Front Panel

**Figure 13** Hardware Front Panel of the  
PXI-1440B IF Downconverter Module



### CAUTION

The PXI-1440B IF Downconverter Module is designed to be used with the PXI-1420 MW Downconverter Module and PXI-1430 RF Downconverter Module.

The maximum power input to any of the input connectors (IF A IN or REF A IN 100/225 MHz) must not exceed +10 dBm!

**STATUS LED** This LED indicates the overall health of the PXI-1440B. This includes the power supplies and other hardware.

The PXI-1440B has extensive built-in-test (BIT). Additional insight can be learned by reading the status section of the Soft Front Panel.

The STATUS LED can have four possible conditions:

- **Green** indicates that all power supplies are functioning within their tolerances and all hardware is functioning.
- **Amber** indicates that all power supplies are functioning within their tolerances, but there is other hardware failures.
- **Red** indicates a failure in the power supplies and module hardware. This can be a catastrophic failure.
- **Off** indicates a failure in the power supplies, but module hardware seems to be functioning. Module hardware functioning indication can be erroneous in this mode since this circuitry can be compromised by a power supply failure.

**ACCESS LED** This Solid AMBER LED blinks to indicate each time the module is written to or read from.

**IF OUT** SMB (m) connector is used to deliver an IF output signal out of the front panel. The IF output signal is supplied through either the IF A IN or IF B IN connectors.

**IF A IN** SMB (m) connector is used to supply an IF input signal.

The IF input signal can be supplied by the PXI-1430 RF Downconverter Module or the PXI-1420 MW Downconverter Module and output by the PXI-1440B IF Downconverter Module one of two ways:

- (bypass mode) directly to the IF OUT connector, in a range of 100 kHz to 425 MHz which bypasses the filtering/mixing/amplification circuitry.
- (filtered/mixed/amplified) through filtering/mixing/amplification circuitry to produce a 25 MHz centered IF output signal.

**VIDEO OUT** SMB (m) connector is used to output the video output signal which is enabled at all times. The video output is a DC level which is representative of the total signal contained within the IF passband of the system.

This video output consists of the combined video output of both signals that can be input into IF A IN; these IF input signals can be supplied by the PXI-1430 RF Downconverter Module or the PXI-1420 MW Downconverter Module.

**REF A IN 100/225 MHz** SMB (m) connector is used to deliver a 100 MHz reference signal into the front panel. This 100 MHz reference signal can be supplied by the PXI-1450B Local Oscillator Module from either the REF A OUT 100 MHz or REF B OUT 100 MHz. These 100 MHz reference signals are phase coherent with the 10 MHz reference being used.

**REF OUT 225 MHz** SMB (m) connector is used to deliver a 225 MHz output reference signal out of the front panel. This 225 MHz reference signal can be enabled or disabled through software driver function and by default is disabled.

In a master-slave system configuration, the 225 MHz reference signal output is enabled on the master module, and the slave module's REF A IN 100/225 MHz port is connected to the REF OUT 225 MHz port, allowing multiples of slave modules to be cascaded.

**CAUTION**

The maximum power output of the IF AUX OUT connector can exceed +20 dBm!

Care should be used when connecting this IF AUX OUT to a digitizer or other equipment. When the IF AUX OUT normal operating range is exceeded, the overload indicator will be illuminated. (Refer to [Table 2](#).)

---

**IF AUX OUT** SMB (m) connector is used to deliver a narrow-band IF signal output centered on 25 MHz out of the front panel.

## Soft Front Panel

### Control Tab

**Figure 14** Control Tab



**Serial Number, Soft Front Panel, Last Cal Date, and FPGA Date Code** shown in the top-right corner of the Soft Front Panel is information about the PXI module being controlled with this Soft Front Panel. This information cannot be changed through the Soft Front Panel.

**Stop Button** This button is used to stop the Soft Front Panel from reading and writing to the PXI module; it halts the program and is the preferred way to exit the program.

**Select Reference Input** These selection buttons are used to select between 100 MHz REFERENCE or 225 MHz REFERENCE input.

- When 100 MHz REFERENCE is selected, the internal local oscillator is referenced to a 100 MHz reference clock.
- When 225 MHz REFERENCE is selected, the external 225 MHz signal becomes the unit's local oscillator.

**Select Output Path** These selection buttons are used to select between the IF OUT (Wide-BW) or IF AUX OUT as the IF output.

- When IF OUT (Wide-BW) is selected, the IF input signal that is applied to IF A IN is directly delivered to the IF OUT (Wide-BW).
- When IF AUX OUT is selected, the IF input signal that is applied to either IF A IN is used to deliver a narrow-band IF signal output centered on 25 MHz out of the front panel. The input signal at IF A IN must be centered at 250 MHz in order to produce 25 MHz at IF AUX OUT.

**Select 225 MHz Out** These selection buttons are used to select between 225 MHz reference output buffer ON or OFF.

In a master-slave system configuration, the the 225 MHz Out option is to be set ON.

**NOTE**


When the PXI-1440B is utilized as a slave and is the last module in the chain, the 225 MHz Out option should be set to OFF to prevent leakage from the module.

---



**Status** The Status LEDs described in [Table 2](#) display green when the module is functioning properly. A red LED indicated the module is not communicating with the PXI bus.

**Table 2** Soft Front Panel, Status LEDs

Indicator	Description
+5Volts	+5 V power supply displays green when functioning and is within tolerance.
+12 olts	+12 V power supply displays green when functioning and is within tolerance.
+3Volts	+3 V power supply displays green when functioning and is within tolerance.
-12Volts	-12 V power supply displays green when functioning and is within tolerance.
LO3 Sense	Indicates that the internal 225 MHz synthesizer signal is present to drive the internal mixer.
LO3 Lock	Indicates that the internal 225 MHz synthesizer (LO 3) is locked to the REF A IN 100 MHz.
+4 dBm OVL	Displays green when an overload signal is detected at VIDEO OUT before the front panel.
BUSY	Displays green when the PXI Interface is BUSY writing commands to the internal synthesizer module. No other commands should be sent to this PXI module while BUSY is active.
	This number indicates the internal real-time ambient temperature of the module in degrees Celsius.

**Status Indicator** The Status Indicator displays messages related to system configuration. Messages may be errors or warnings.

## Cal DataTab

**Figure 15** Cal Data Tab



The Cal Data tab displays data that is stored in the module hardware. This data is loaded at the factory during initialization and calibration.

The upper portion of this tab displays unit information such as model number, serial number, configuration-control number, FPGA part number, EEPROM part number, and last calibration date.

The bottom portion of this tab displays calibration points from the on-board memory of the unit. Although data values can be viewed from this tab, the Soft Front Panel cannot be used to modify or overwrite the data values. These stored data values are normally utilized by the driver in real-time correction applications.

**Unit Info:**

Each PXI module is identified by three sets of numbers: the model number, serial number (S/N), and a configuration-control number (CCN). See [“PXI Module Identification”](#) on page 38 for an example.

**Model** displays the model along with any special configuration identifiers. These model and special configuration identifiers are assigned by the factory.

**Serial Number** displays the serial number that has been assigned by the factory.

**CCN** displays the configuration control number that has been assigned by the factory.

As Phase Matrix, Inc. continually improves and updates its products, changes to materials occur. When a part or assembly in a Phase Matrix instrument is changed to the extent that it is no longer interchangeable with an earlier part, the configuration control number (CCN) of the instrument is changed.

**FPGA P/N** displays the Phase Matrix part number associated with the Field Programmable Gate Array (FPGA). This FPGA controls all of the I/O functions of the PXI module.

**EEPROM P/N** displays the Phase Matrix part number associated with the Electrically Erasable Programmable Read Only Memory (EEPROM). This EEPROM controls the PXI related configuration such as the manufacture ID, etc.

**Last Cal Date** displays the date that the last calibration was run and that the calibration file was created.

**FPGA Date** Displays the applicable FPGA version date.

## PXI-1440B Corrections

The following corrections were made to the IF A IN and IF B IN signal paths.

**IF A IN to IF OUT Loss** This table displays the correction data associated with the IF A IN to IF OUT signal path; this data can be used to mathematically improve (flatten) the signal path.

**Table 3** IF A IN to IF OUT Loss

230	240	250	260	MHz
-1.11	-1.06	-1.03	-1.06	dB

Use the Horizontal Slider Bar to view correction values to the left and right of the values currently being displayed.

## IF AUX OUT Corrections

The following corrections were made to the 25 MHz filter that can be used when the output path is selected to be IF AUX OUT.

**25 MHz Filter Response** This table displays the correction data associated with the 25 MHz wide filter centered at 25 MHz; this data can be used to mathematically improve the 25 MHz filter response.

**Table 4** 25 MHz Filter Response

21.398	21.399	21.800	22.04	MHz
0.82	0.85	0.86	0.88	dB

Use the Horizontal Slider Bar to view correction values to the left and right of the values currently being displayed.



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## Step 5. Confirm Basic Module Operation (MASTER)

### Purpose of Confirmation

The purpose of this process is to confirm the basic module operation of the PXI-1440B.

### Confirmation Requirements

The PXI-1440B is confirmed by measuring the IF center frequency and power at the IF OUT and IF AUX OUT with a 250 MHz input frequency. This process confirms that all connectors, switches, cables, and related circuitry used in these signal paths are functional.

### Equipment Requirements

Figure 16 shows a block diagram of the equipment setup with the type of equipment (or equivalent performance) required to confirm basic module operation.

**Table 5** Equipment Requirements to Confirm Basic Module Operation

Qty	Equipment	Description
1	Agilent 83650A	Signal Generator, 26.5 GHz
1	Agilent 8566B	Spectrum Analyzer
1	NI PXIe-1065	PXI chassis
1	NI PXI-8106	PXI Embedded Controller with Windows 7/XP
1		Display

## Equipment Settings

---

### Signal Generator

CW	250 MHz
Modulation	OFF
Level	-2 dBm

---

### Spectrum Analyzer

Frequency	25 MHz
Span	50 MHz
RBW	1 MHz
VBW	Auto
Attenuation	10 dB
Scale	1 dB/Div
Reference	0 dB

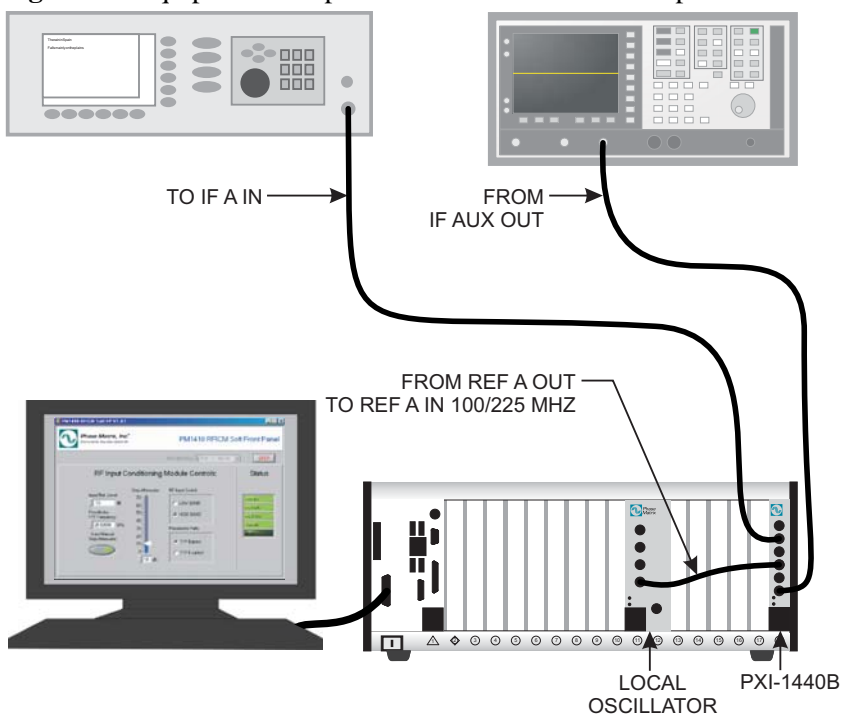
---

### PXI-1450B Local Oscillator Module

Frequency	Initialized to default settings. The PXI-1450B Local Oscillator Module is only used to supply a 100 MHz reference.
Modulation	OFF

## Equipment Setup to Confirm Basic Module Operation

**Figure 16** Equipment Setup to Confirm Basic Module Operation



### IF OUT, IF AUX OUT, IF Center Frequency, and Power Check

- 1 Connect the equipment as shown in [Figure 16](#).
  - Connect the RF Output of the Signal Generator to IF A IN of the PXI-1440B IF Downconverter Module.
  - Connect the REF A OUT of the PXI-1450B Local Oscillator Module to REF A IN 100/225 MHz of the PXI-1440B IF Downconverter Module.
  - Connect the IF AUX OUT of the PXI-1440B IF Downconverter Module to the RF Input of the Spectrum Analyzer.

#### CAUTION

The maximum power input to any of the input connectors (IF A IN and REF A IN 100 MHz) must not exceed +10 dBm!

- 2 Set the Signal Generator frequency to 250 MHz and the output power to -2 dBm.

- 3 Using the Soft Front Panel of the PXI-1440B IF Downconverter Module, set Select Output Path to IF AUX OUT.
- 4 Confirm that the output frequency on the Spectrum Analyzer is 25 MHz and the power level is -2 dBm +/- 2 dB.
- 5 Using the Soft Front Panel of the PXI-1440B, set Select Output Path to IF OUT.
- 6 Connect the Spectrum Analyzer to IF OUT.
- 7 Confirm that the output frequency on the Spectrum Analyzer is 250 MHz and the power level is -2 dBm +/- 3 dB.





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## Step 6. Confirm Basic Module Operation (SLAVE)

### Purpose of Confirmation

The purpose of this process is to confirm the basic module operation of the PXI-1440B in a slave configuration.

### Confirmation Requirements

The PXI-1440B is confirmed by measuring the IF center frequency and power at the IF OUT and IF AUX OUT with a 250 MHz input frequency. This process confirms that all connectors, switches, cables, and related circuitry used in these signal paths are functional.

### Equipment Requirements

Figure 17 shows a block diagram of the equipment setup with the type of equipment (or equivalent performance) required to confirm basic module operation.

**Table 6** Equipment Requirements to Confirm Basic Module Operation

Qty	Equipment	Description
1	Agilent 83650A	Signal Generator, 26.5 GHz
1	TBA	Oscilloscope
1	NI PXIe-1065	PXI chassis
1	NI PXI-8106	PXI Embedded Controller with Windows 7/XP
1		Display

## Equipment Settings

---

### Signal Generator

CW	250 MHz
Modulation	OFF
Level	-2 dBm

---

### Oscilloscope

Frequency	25 MHz
Span	50 MHz
RBW	1 MHz
VBW	Auto
Attenuation	10 dB
Scale	1 dB/Div
Reference	0 dB

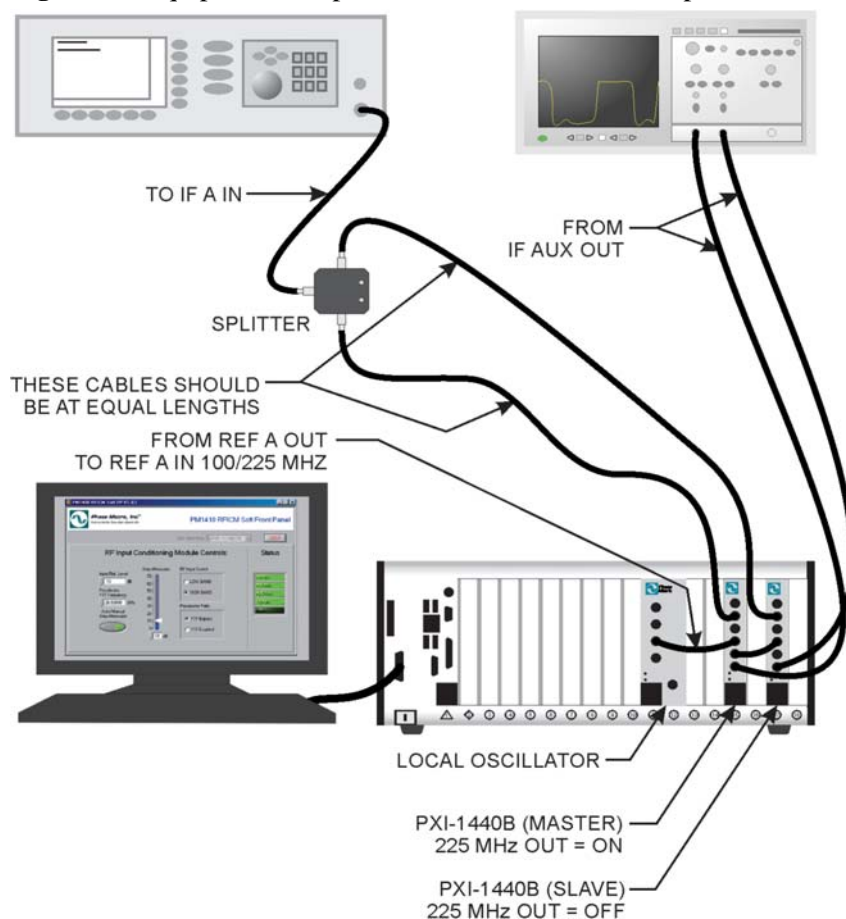
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### PXI-1450B Local Oscillator Module

Frequency	Initialized to default settings. The PXI-1450B Local Oscillator Module is only used to supply a 100 MHz reference.
Modulation	OFF

## Equipment Setup to Confirm Basic Module Operation

**Figure 17** Equipment Setup to Confirm Basic Module Operation



### IF OUT, IF AUX OUT, IF Center Frequency, and Power Check

- 1 Connect the equipment as shown in [Figure 17](#).
  - Connect the RF Output of the Signal Generator to the splitter.
  - Connect each end of the splitter to the IF A IN of both the PXI-1440B IF Downconverter Modules.
  - Connect the REF A OUT of the PXI-1450B Local Oscillator Module to REF A IN 100/225 MHz of the PXI-1440B IF Downconverter Module in the master function.
  - Connect the IF AUX OUT of the PXI-1440B IF Downconverter Module to the RF Input of the Oscilloscope.

#### CAUTION

The maximum power input to any of the input connectors (IF A IN and REF A IN 100 MHz) must not exceed +10 dBm!

**NOTE**

For best results, use cables of equal length for IF A input.

---

- 2 Set the Signal Generator frequency to 250 MHz and the output power to -2 dBm.
- 3 Using the Soft Front Panel of the PXI-1440B IF Downconverter Module, set Select Output Path to IF AUX OUT.
- 4 Confirm that the output frequency on the Oscilloscope is 25 MHz and the power level is -2 dBm +/- 2 dB.
- 5 Using the Soft Front Panel of the PXI-1440B IF Downconverter Module, set Select Output Path to IF OUT.
- 6 Connect the Oscilloscope to IF OUT.
- 7 Confirm that the output frequency on the Oscilloscope is 250 MHz and the power level is -2 dBm +/- 3 dB.

## SMA Connector Care

Follow these recommendations to ensure the PXI module's SMA connectors remain stable and provide optimal conductivity.

### Connecting SMAs

Always inspect connectors for crooked or bent pins and other visible damage. Also, check to ensure that connectors are clean before attaching mating connectors.

To attach mating connector, align both connectors and lightly tighten nut by hand. Do not over tighten connection. Use an 8 inch-pound torque wrench to complete the connection.

### Cleaning SMAs

Keep connectors clean. Use compressed air to remove debris of any type. After applying compressed air, use isopropyl alcohol on a cotton swab to wipe the connector's cavity, and use a dry cotton swab to absorb remaining alcohol. Never use abrasives to clean connectors.

### Storing PXI units that have SMAs

Place a protective cap on connectors when not in use. Never set a PXI module connector-side down or forcibly next to another object such that the connectors contact the object.

## If a Problem Occurs

If a problem occurs, perform the following checks before returning a PXI module for repair:

- 1 Check that all system components are powered on:
  - PXI mainframe
  - PXI-1440B IF Downconverter Module
  - PXI-1450B Local Oscillator Module
  - Signal Generator
  - Spectrum Analyzer
- 2 Check that all cable connections are properly made. (Refer to the [“IF OUT, IF AUX OUT, IF Center Frequency, and Power Check”](#) on page 31.)
- 3 Check that the STATUS LED is Green. (Refer to [page 21](#).)
- 4 Check that the ACCESS LED switches each time that a path is selected. (Refer to [page 21](#).)
- 5 Contact Phase Matrix Customer Support for additional help.

## Service Information

### Periodic Maintenance

No periodic preventive maintenance is required. There are no hardware adjustments within the PXI-1440B.

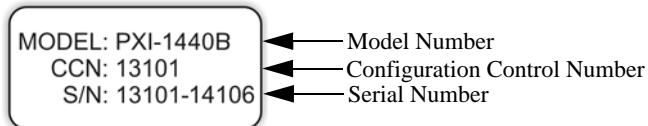
Phase Matrix recommends the PXI module be calibrated every 12 months from the time the module is initially powered on. The specific calibration interval depends on the accuracy required by the end user's application. Accuracy of the module is not affected by non-operation when the module is properly stored in its original packaging or equivalent.

### PXI Module Identification

Each PXI module is identified by three sets of numbers: the model number, a configuration-control number (CCN), and a serial number (S/N).

These numbers are located on a label affixed to the frame on the side of the PXI-1440B (some units may have separate CCN and serial-number labels). The model number, CCN, serial number, and the numbers of any options must be included in any correspondence regarding your PXI module. A typical serial-number label is shown in [Figure 18](#).

**Figure 18** Example of a Label Affixed to the Side of the PXI Module



### Factory Service

If you are returning a PXI module to Phase Matrix for service or repair, be sure to include the following information with the shipment:

- Name and address of owner.
- Model, complete serial number, and CCN of the PXI module.
- A complete description of the problem. Be sure to provide enough information so that the problem can be verified:
  - Under what conditions did the problem occur?
  - Did the unit work and then fail?
  - What other equipment was connected to the PXI module when the problem occurred?
- The name and telephone number of someone familiar with the problem who can be contacted by Phase Matrix if any further information is required.

## **Shipping Instructions**

- 1** Place the PXI module in an antistatic bag or enclosure.
- 2** Wrap the PXI module in heavy plastic or kraft paper.
- 3** Repack the PXI module in the original container, if available.

If the original container cannot be used, pack the PXI module in a heavy (275 pound test) double-walled carton with approximately four inches of packing material between the PXI module and the inner carton.

- 4** Seal the carton with strong filament tape or strapping.
- 5** Mark the carton to indicate that it contains a fragile electronic instrument.
- 6** Ship the PXI module to Phase Matrix at the following address:

Phase Matrix, Inc.  
4600 Patrick Henry Drive  
Santa Clara CA 95054  
Tel: 408-610-6810  
[www.phasematrix.com](http://www.phasematrix.com)