

# VXI/VME

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## VXI/VMEpc<sup>™</sup> 600 Series User Manual

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Web Address: <http://www.natinst.com>

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BBS United Kingdom: 01635 551422

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**National Instruments Corporate Headquarters**

6504 Bridge Point Parkway Austin, Texas 78730-5039 USA Tel: 512 794 0100

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This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, may cause interference to radio and television reception. Classification requirements are the same for the Federal Communications Commission (FCC) and the Canadian Department of Communications (DOC). This equipment has been tested and found to comply with the following two regulatory agencies:

### Federal Communications Commission

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**Notices to User:** *Changes or modifications not expressly approved by National Instruments could void the user's authority to operate the equipment under the FCC Rules.*

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If necessary, consult National Instruments or an experienced radio/television technician for additional suggestions. The following booklet prepared by the FCC may also be helpful: *Interference to Home Electronic Entertainment Equipment Handbook*. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

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This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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# About This Manual

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This manual contains instructions for installing and configuring the National Instruments VXI/VMEpc 600 Series embedded computer kit. The VXI/VMEpc 600 Series includes all the models of the VXIpc 600 Series and VMEpc 600 Series embedded computers.

## Organization of This Manual

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This manual is organized as follows:

- Chapter 1, [Introduction](#), describes the VXI/VMEpc 600 Series of embedded VXI computers, lists what you need to get started, describes the hardware, and lists optional equipment and software.
- Chapter 2, [Functional Overview](#), contains functional descriptions of each major logic block on the VXI/VMEpc 600 Series.
- Chapter 3, [Configuration and Installation](#), contains the instructions to configure and install the VXI/VMEpc 600 Series.
- Chapter 4, [BIOS](#), contains information on BIOS (Basic Input Output System), the low-level interface between the hardware and PC software that configures and tests your hardware at boot up.
- Appendix A, [Specifications](#), describes the environmental, electrical, and mechanical specifications of the VXI/VMEpc 600 Series.
- Appendix B, [LED Indicators](#), describes how to read the LEDs on the front panel to interpret the status of the VXI/VMEpc 600 Series.
- Appendix C, [Front Panel and Connectors](#), describes the front panel and connectors on the VXI/VMEpc 600 Series.
- Appendix D, [Common Questions](#), answers common questions you may have when using the VXI/VMEpc 600 Series.
- Appendix E, [Customer Communication](#), contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The [Glossary](#) contains an alphabetical list and description of terms used in this manual, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.
- The [Index](#) contains an alphabetical list of key terms and topics used in this manual, including the page where you can find each one.



# Conventions Used in This Manual

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The following conventions are used in this manual:

<>

Angle brackets enclose the name of a key on the keyboard—for example, <Enter>.

-

A hyphen between two or more key names enclosed in angle brackets denotes that you should simultaneously press the named keys—for example, <Control-Alt-Delete>.

◆

The ◆ symbol indicates that the text following it applies only to a specific product, a specific operating system, or a specific software version.



This icon to the left of bold italicized text denotes a note, which alerts you to important information.



This icon to the left of bold italicized text denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.



This icon to the left of bold italicized text denotes a warning, which advises you of precautions to take to avoid being electrically shocked.

**bold**

Bold text denotes the names of menus, menu items, dialog box buttons or options, or LEDs.

***bold italic***

Bold italic text denotes a note, caution, or warning.

*italic*

Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept.

monospace

Text in this font denotes text or characters that you should literally 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, variables, filenames, and extensions.

**monospace bold**

Bold text in this font denotes the messages and responses that the computer automatically prints to the screen.

VXI/VMEpc 600 Series

The term *VXI/VMEpc 600 Series* refers to a series of B-size, two-slot VXI or VME embedded controllers. Currently, this series consists of the VXIpc-650 and VMEpc-650. This term is used when information applies equally to either the VXI or VME model.

# How to Use This Documentation Set

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Begin by reading the *Getting Started with Your VXI/VMEpc 600 Series* manual for your operating system to get basic instructions for setting up the hardware and software. This brief quick-start manual describes how to get started with your kit using the default hardware and software settings, and how to configure and use the NI-VXI software. Refer to the following manuals for more information about the hardware or software.

This manual, the *VXI/VMEpc 600 Series User Manual*, contains more details about changing the installation or configuration from the defaults, and using the hardware.

When you are familiar with the material in these manuals, you can begin to use the *NI-VXI User Manual*. This manual presents the concepts of VXI and prepares you for detailed explanations of the NI-VXI functions. The NI-VXI online help describes the NI-VXI functions to help you fully understand the purpose and syntax of each function. You can find this same information in the *NI-VXI Programmer Reference Manual*. These two manuals are available in the `c:\NIVXI\Manuals` directory under the names `NI-VXIUsersMan.pdf` and `NI-VXIProgrammerMan.pdf`, respectively. Use the Acrobat Reader program, Version 3 or later, to open these files.

You can also access the NI-VXI online help for Windows 95/NT in the NIVXI folder.

Refer to the *NI-VXI Graphical Utilities Reference Manual* and the *NI-VXI Text Utilities Reference Manual* to learn more about the NI-VXI utilities.

Refer to the *NI-VISA User Manual* to learn about VISA and how to use it in your system. The NI-VISA online help describes the attributes, events, and operations you can use in NI-VISA. You can find this same information in the *NI-VISA Programmer Reference Manual*. These two manuals are available in the `c:\Vxipnp\os\NIvisa\Manuals` directory (where `os` is either `Win95` or `WinNT`) under the names `NI-VISAUsersMan.pdf` and `NI-VISAProgrammersMan.pdf`, respectively. Use the Acrobat Reader program, Version 3 or later, to open these files.

## Related Documentation

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The following documents contain information that you may find helpful as you read this manual:

- ANSI/IEEE Standard 1014-1987, *IEEE Standard for a Versatile Backplane Bus: VMEbus*
- ANSI/IEEE Standard 1155-1993, *IEEE VMEbus Extensions for Instrumentation: VXIbus*
- ANSI/VITA 1-1994, *VME64*
- VXI-6, *VXIbus Mainframe Extender Specification*, Rev. 1.0, VXIbus Consortium

## Customer Communication

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National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you to complete. These forms are in Appendix E, [Customer Communication](#), at the end of this manual.

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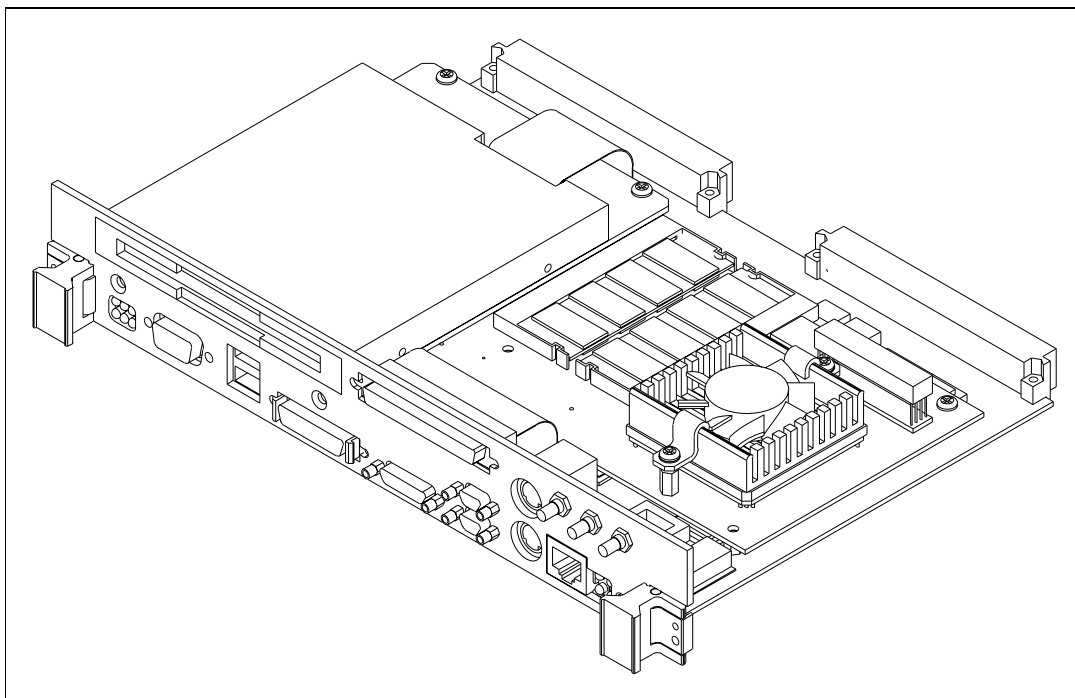
# Introduction

This chapter describes the VXI/VMEpc 600 Series of embedded VXI computers, lists what you need to get started, describes the hardware, and lists optional equipment and software.

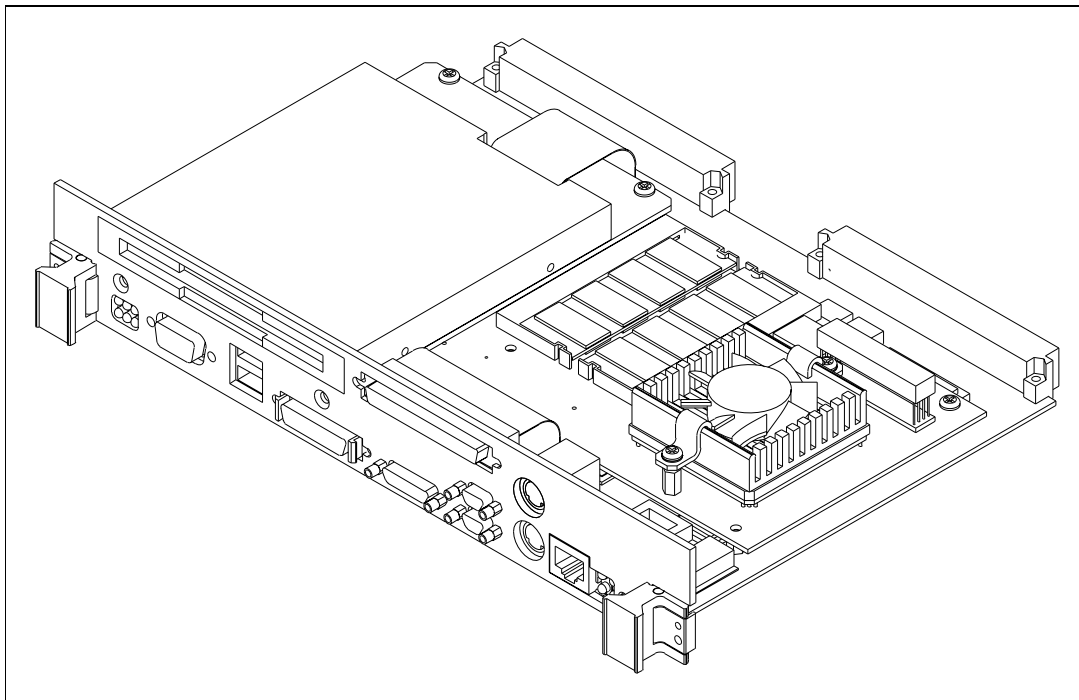
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## Overview

The VXI/VMEpc 600 Series consists of the VXIpc-650 and VMEpc-650 models, which are functionally equivalent in many ways. Figure 1-1 shows the VXI model and Figure 1-2 shows the VME model. Refer to Appendix C, *Front Panel and Connectors*, for information about the location and pinout assignment of each connector on the module.



**Figure 1-1.** VXIpc-650 Embedded Controller



**Figure 1-2.** VMEpc-650 Embedded Controller

The VXI/VMEpc 600 Series controllers are B-size, embedded computers based on x86 Processor architecture and on the Peripheral Component Interface (PCI) bus. These computers are high-performance, easy-to-use platforms for controlling VXI/VMEbus systems, featuring complete VXI and VME functionality through interactive utilities and C function calls. In addition, the VXI/VMEpc 600 Series has Ethernet capability plus an IEEE 488.2 interface that is compatible with the NI-488.2 architecture.

The VXI/VMEpc 600 Series is a custom computer that you install directly in two B-size slots of your VXI or VME mainframe. An embedded computer can take full advantage of the VXI/VME high-performance backplane capabilities and give you direct control of VXI registers, memory, interrupts, and triggers.

All models in the VXI/VMEpc 600 Series are fully *VXIplug&play* compliant and are compatible with PC-compatible software tools, the National Instruments LabVIEW and LabWindows/CVI application software, and the NI-VXI, NI-VISA, and NI-488.2 bus interface software.

## Optional Equipment

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You can contact National Instruments to order any of the following optional equipment:

- COM1/2 adapter cable
- Enhanced parallel port adapter cable
- Single-shielded 2 m GPIB cable

## National Instruments Software

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National Instruments has developed several software kits you can use with the VXI/VMEpc 600 Series. The NI-VXI bus interface software includes a Resource Manager, an interactive VXI resource editor program, a comprehensive library of software routines for VXI/VME programming, and an interactive control program for interacting with VXI/VME. You can use this software to seamlessly program multiple-mainframe configurations and have software compatibility across a variety of VXI/VME controller platforms.

The NI-488.2M software kit gives you access to the industry-standard NI-488.2M software for controlling external GPIB instruments through the GPIB port on the front panel of your VXI/VMEpc 600 Series. The GPIB interface on your VXI/VMEpc controller is fully compatible with the NI-488.2M driver for a variety of operating systems. Any software using NI-488.2M will run on the VXI/VMEpc 600 Series.

You can use the NI-VISA high-level programming API to program GPIB, serial, parallel, and VXI/VME devices in much the same manner.

You can also use the National Instruments LabVIEW and LabWindows/CVI application programs and instrument drivers to ease your programming task. These standardized programs match the modular virtual instrument capability of VXI and can reduce your VXI/VMEbus software development time. These programs are fully *VXIplug&play* compliant and feature extensive libraries of GPIB, Serial, and VXI instrument drivers written to take full advantage of direct VXI control. LabVIEW and LabWindows/CVI include all the tools needed for instrument control, data acquisition, analysis, and presentation.

LabVIEW is a complete programming environment that departs from the sequential nature of traditional programming languages and features a graphical programming environment.

LabWindows/CVI is an interactive C development environment for building test and measurement and instrument control systems. It includes interactive code-generation tools and a graphical editor for building custom user interfaces.

## Hardware Description

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### VXI Slot 0 Functionality

You can use the VXIpc 600 Series computers to achieve full VXI Slot 0 control of your VXI system. You can also install the module in another slot and use it in Non-Slot 0 mode. You do not have to change any jumpers when moving between these two modes, as the VXIpc 600 Series automatically detects whether it is installed in Slot 0 and automatically enables or disables the onboard Slot 0 circuitry.

### VME Slot 1 Functionality

In the same way, you can install the VMEpc-650 in Slot 1 for full System Controller functionality, or you can use it in Non-Slot 1 mode. The VMEpc-650 automatically detects whether it is in the System Controller slot and it automatically enables or disables the onboard Slot 1 circuitry.

### Custom Application-Specific Interface Chips

The VXI/VMEpc 600 Series uses the MITE and MANTIS custom ASICs to deliver high VXI/VME performance DMA block-mode data transfer rates across the VXI/VME backplane.

The VXI/VMEpc 600 Series has the TNT4882C custom ASIC to give full GPIB control of external instruments via a front-panel connector. GPIB capability is fully compatible with IEEE 488.2 and the industry-standard NI-488.2 driver for a variety of operating systems.

The MITE custom ASIC is a sophisticated dual-channel DMA controller with standard interfaces for VXI and PCI. By using MITE DMA to transfer data and commands to and from devices, the MITE frees the computer's microprocessor to perform other tasks such as data analysis and presentation. In addition to DMA, the MITE incorporates the new VME64 MBLT—8-byte block transfers in which both the address bus and data bus are used to transfer data—directly into the ASIC to perform the fastest transfer operation to instruments. With the multiple windowing scheme of the MITE, you can easily access all of VXI/VME address space.

- ◆ **VXI users only**—The VXI trigger interface on the VXIpc 600 Series controller is based on the MANTIS custom ASIC. The front panel has two SMB trigger I/O connectors, which you can use to route any of the TTL trigger lines between the backplane and external devices. The MANTIS ASIC on the controller provides the complete VXI interface to the backplane connector in a single chip. The VXIpc 600 Series can respond to all VXI-defined protocols on all P2 TTL and ECL trigger lines at the same time. The MANTIS features an internal cross-matrix switching system for routing between lines as well as to and from the front panel and onboard clocks.

**Note**

*The MANTIS ASIC contains the exact functionality of the TIC ASIC, which appeared on the VXIpc-486 Model 500 Series controllers. Any application that currently uses any of the TIC functionality, such as the crosspoint switch and counter/timers, can run on a controller containing the MANTIS ASIC without modification.*

## Front Panel Features

The VXI/VMEpc 600 Series has the following front-panel features:

- Internal 3.5 in. floppy drive
- System reset push-button
- Up to 14 front-panel connectors as listed below:
  - Two RS-232 Serial
  - Extended Capabilities Parallel (ECP)
  - Super VGA
  - GPIB (IEEE 488.2)
  - 10/100 BaseT Ethernet
  - Ultra Wide SCSI
  - PS/2-Style Keyboard
  - PS/2-Style Mouse
  - Two Universal Serial Bus (USB)
  - External Clock (VXIpc only)
  - Trigger Output (VXIpc only)
  - Trigger Input (VXIpc only)
- Six front-panel LEDs that show VXI and PC status:
  - **SYSF** LED indicates that the VXI/VMEbus SYSFAIL line is asserted.



- **FAIL** LED indicates that the VXI/VMEpc-650 is driving the SYSFAIL signal.
- **TEST** LED indicates that the VXI/VMEpc-650 is performing its self-tests or startup Resource Manager operations.
- **ONLINE** LED indicates that the VXI/VMEpc-650 is performing or has completed its startup Resource Manager operations.
- **ACC** LED indicates when the VXI/VMEpc-650 MODID line is asserted or the VXIbus registers or shared memory are accessed by another bus master.
- **DRV** LED indicates when the internal hard drive is in use.
- Four front-panel LEDs that show Ethernet port status:
  - **RX** LED indicates that the VXI/VMEpc-650 Series is receiving data through its Ethernet port.
  - **TX** LED indicates that the VXI/VMEpc-650 Series is transmitting data through its Ethernet port.
  - **LNK** LED reflects Ethernet link status.
  - **100B-T** LED indicates Fast Ethernet Link at 100 Mbits/s when lit.

**Table 1-1.** VXI/VMEpc 600 Series Peripherals Overview

| Peripheral | External Connector             | Bus | Function  |
|------------|--------------------------------|-----|---|
| Video      | 15-pin DSUB (standard VGA)     | PCI | High-resolution/color support for a Super VGA monitor                     |
| IDE        | None                           | PCI | Support for internal fast ATA-2 hard drive                                |
| Ethernet   | RJ-45                          | PCI | 10/100 BaseT Ethernet connection  |
| SCSI       | 68-pin UW-SCSI                 | PCI | External connection for hard drives, CD-ROM drives, and so on             |
| GPIB       | 24-pin CHAMP                   | ISA | IEEE 488.2 interface compatible with the National Instruments AT-GPIB/TNT |
| VXI        | Two 96-pin DIN (rear of board) | PCI | High-performance VXIbus interface   |
| Serial     | Serial Port (Mini DSUB)        | ISA | 16550 serial ports  |
| Parallel   | Parallel Port (IEEE 1284)      | ISA | Extended capabilities   |
| USB        | Four-wire USB                  | PCI | Universal Serial Bus device   |

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# Functional Overview

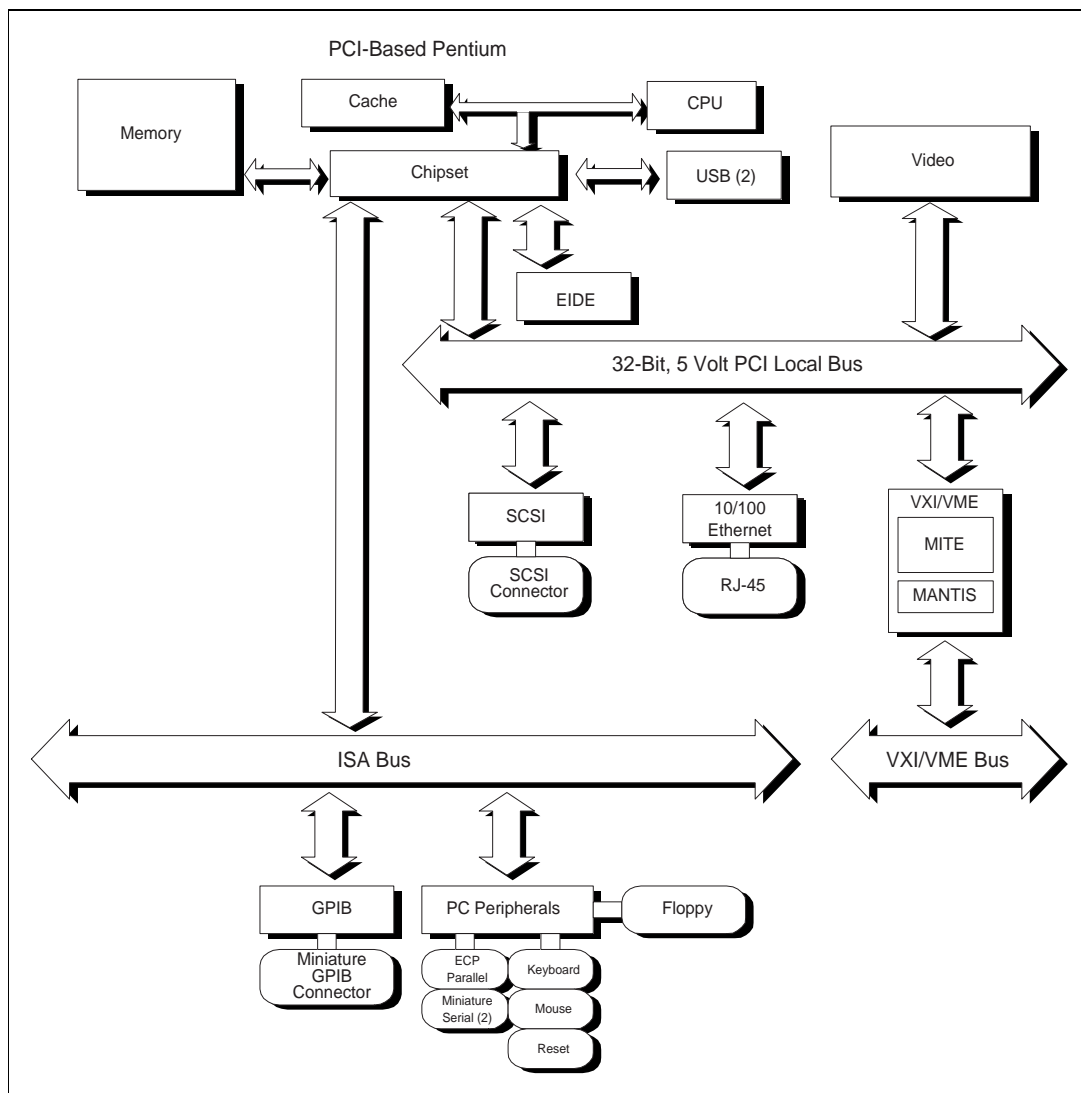
This chapter contains functional descriptions of each major logic block on the VXI/VMEpc 600 Series.

## VXI/VMEpc 600 Series Functional Description

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The VXI/VMEpc 600 Series is a VXI/VMEbus embedded controller in a B-size form factor. It includes many high-performance peripherals that normally require add-in cards on desktop PCs. In addition, it has a VXI/VMEbus interface that is controlled from the PCI local bus, providing extremely high performance and reliability.

Figure 2-1 is a functional block diagram of the VXI/VMEpc 600 Series. Following the diagram is a description of each logic block shown.



**Figure 2-1.** VXI/VMEpc 600 Series Block Diagram

The VXI/VMEpc 600 Series consists of the following logic blocks:

|                       |   |
|-----------------------|---|
| <b>Video</b>          | The video circuitry is a plug-in PCI card that has a 64-bit data path and 2 MB of EDO DRAM.   |
| <b>IDE</b>            | This is dedicated IDE circuitry providing fast ATA-2 transfers to the internal hard drive.  |
| <b>VXI/VME</b>        | This is the PCI-VXI/VMEbus interface circuitry. The MITE is a National Instruments ASIC developed to efficiently manage data transfers between the VXI/VMEbus and the processor (via the PCI bus). The MANTIS ASIC (also developed by National Instruments) performs VXI/VMEbus arbitration and manages VXIbus interrupts and triggers. Also part of the VXIbus interface are the SMB connectors, which you can use to route triggers and the CLK10 signal to or from the VXIbus. |
| <b>Ethernet</b>       | This is an PCI-based Ethernet circuit. It uses an RJ-45 connector for access to an external Ethernet 10/100 Base-T LAN.   |
| <b>GPIB</b>           | This is the IEEE 488.2 port. It uses the National Instruments TNT4882 ASIC for maximum performance as an ISA-based GPIB controller.   |
| <b>PC Peripherals</b> | These blocks represent the other peripherals supplied by the VXI/VMEpc 600 Series. The VXI/VMEpc 600 Series has PS/2 mouse and keyboard ports, two miniature serial ports, an ECP/EPP parallel port, reset button, and a 1.44 MB, 3.5 in. floppy drive.   |
| <b>System I/O</b>     | This block has the bridge between the PCI bus and the ISA bus. It also has PCI bus arbitration logic and integrates PC-specific hardware such as the DMA and interrupt controllers.   |
| <b>SCSI</b>           | The SCSI circuitry uses a PCI-SCSI bridge to provide a flexible Ultra Wide SCSI connection on the front panel, usable for such devices as external hard disks and CD-ROM drives.  |

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# Configuration and Installation

This chapter contains the instructions to configure and install the VXI/VMEpc 600 Series. Unless otherwise noted, these instructions apply to all models in the VXI/VMEpc 600 Series, which currently consists of the VXIpc-650 and the VMEpc-650.



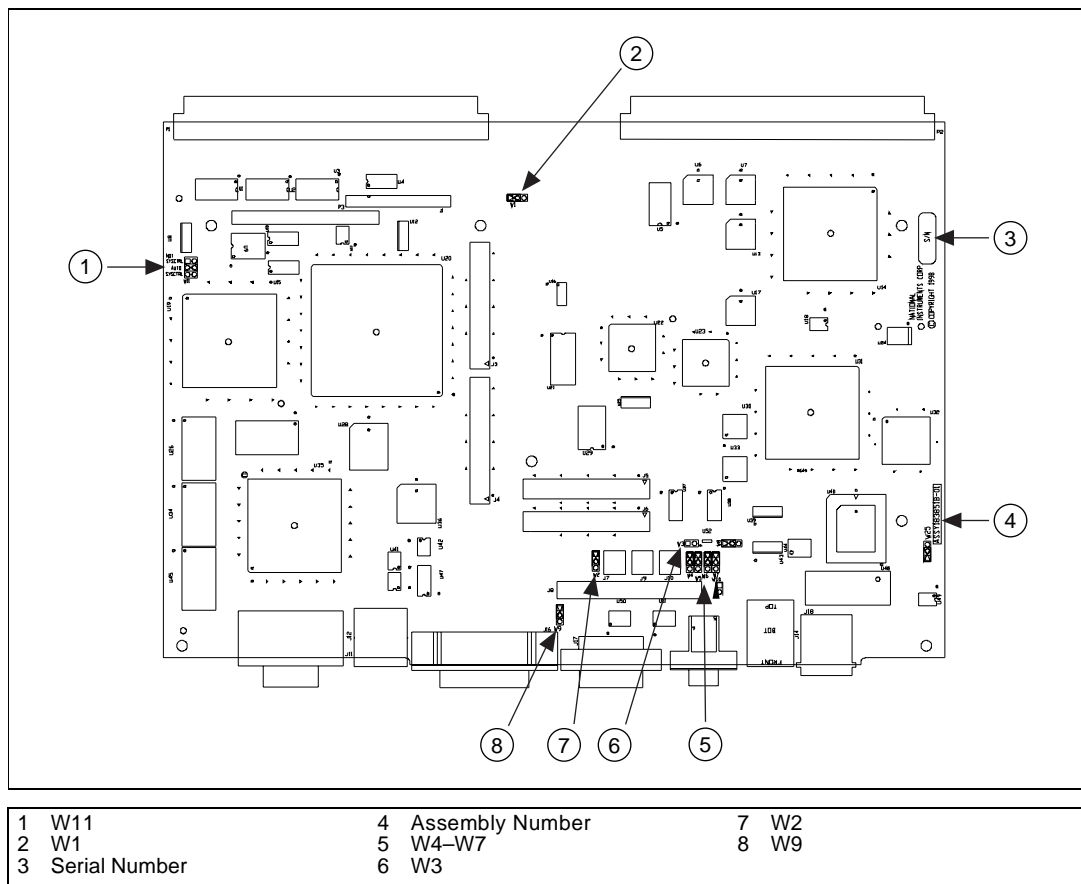
**Caution** *Electrostatic discharge can damage several components on your VXI/VMEpc 600 Series module. To avoid such damage in handling the module, touch the antistatic plastic package to a metal part of your VXI chassis before removing the module from the package.*

## Default Settings

---

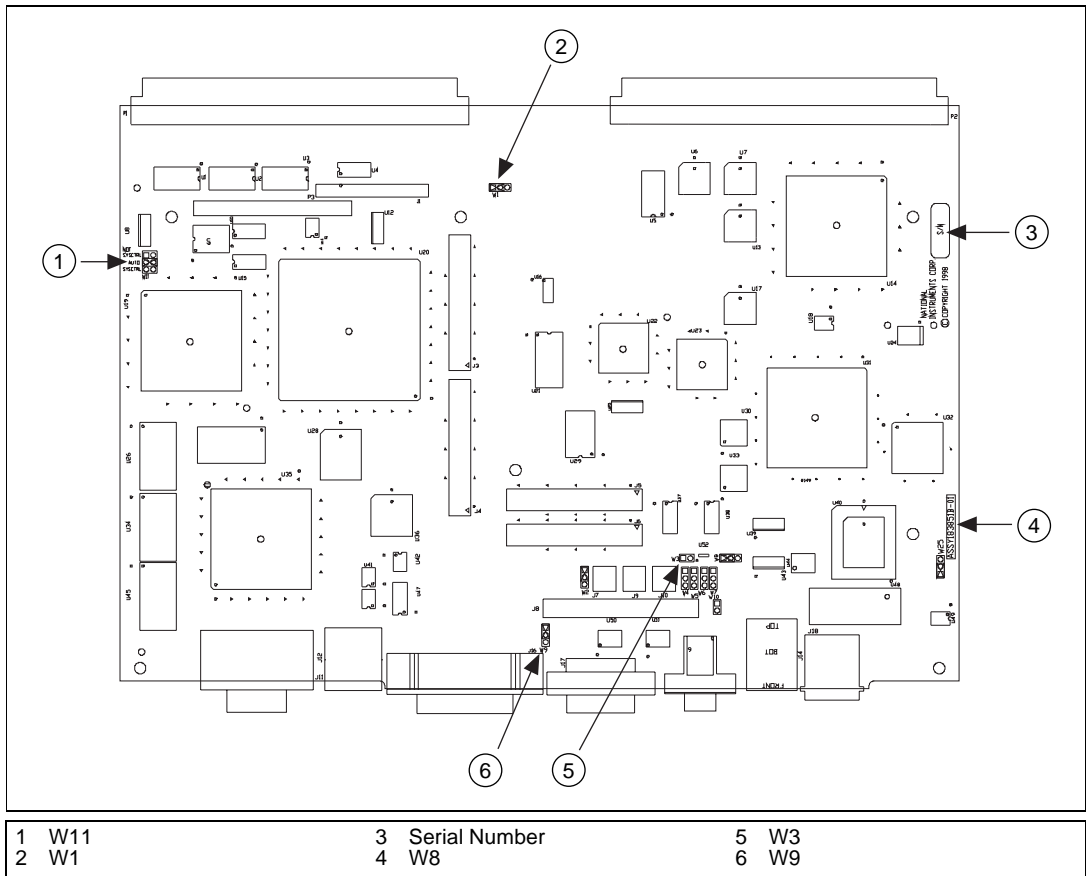
This section summarizes the hardware default settings for the VXI/VMEpc 600 Series for easy reference. The module is set at the factory for the most commonly used configuration.

Figure 3-1 shows the location of the user-configurable jumpers on the VXIpc-650 base board. The figure also shows the location of the serial and assembly numbers.



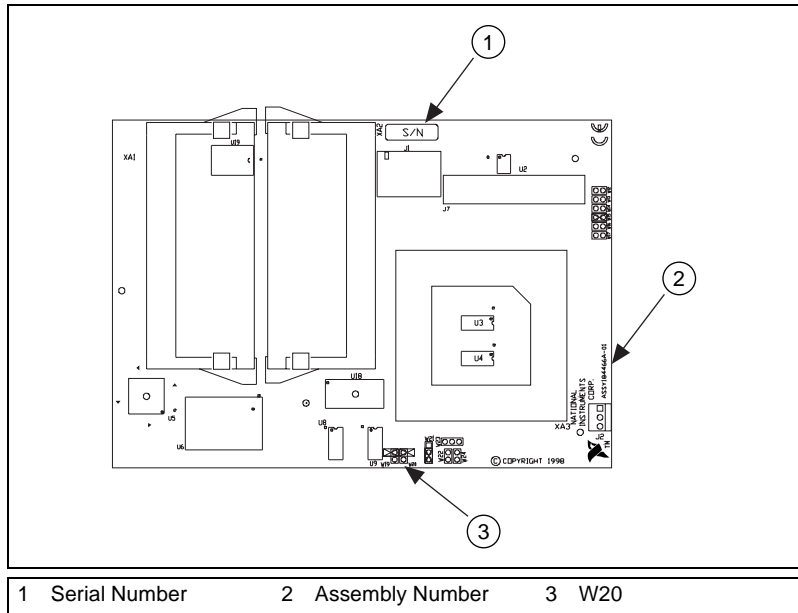
**Figure 3-1.** VXIpc-650 Parts Locator Diagram

Figure 3-2 shows the location of the user-configurable jumpers on the VMEpc-650 base board. The figure also shows the location of the serial and assembly numbers.



**Figure 3-2.** VMEpc-650 Parts Locator Diagram

One of the user-configurable jumpers, W20, is located on the CPU module attached to the base board. Figure 3-3 shows the location of the W20 jumper, which controls the system CMOS setting. Notice that you do not have to remove the CPU module from the base board to configure any of the jumpers on either board. Refer to the [System CMOS](#) section later in this chapter for more information.



**Figure 3-3.** CPU Module Attached to VXI/VMEpc-650



Table 3-1 lists the factory-default settings and options for the onboard jumpers and switches.

**Table 3-1.** VXI/VMEpc 600 Series Hardware Default Settings

| Jumper | Default Setting                          | Optional Setting                                |
|--------|--|---|
| W1     | Enable MITE self-configuration           | Disable MITE self-configuration                 |
| W2     | No termination on external trigger input | Terminate external trigger input to 50 $\Omega$ |
| W3     | Supply SCSI termination                  | Disable SCSI termination                        |
| W4     | Receive CLK10 input from SMB             | Source CLK10 output to SMB                      |
| W5     | No termination on CLK10 input            | Terminate CLK10 input to 50 $\Omega$            |
| W6     | Source CLK10 from onboard oscillator     | Source CLK10 from SMB                           |
| W7     | Non-inverted CLK10 output                | Inverted CLK10 output                           |
| W9     | MITE user configuration                  | MITE factory configuration                      |
| W11    | Enable automatic slot detection          | Force System Controller; Force Non-System Cont. |
| W20    | Normal CMOS operation                    | Clear CMOS                                      |



**Note**

*Please do not adjust the jumpers on any jumper blocks not listed in Table 3-1 unless directed by National Instruments support.*

## Configuring the VXI/VMEpc 600 Series

This section describes how to configure the following options on the VXI/VMEpc 600 Series:

- VXI/VMEbus System Controller/Non-System Controller
- VXIbus CLK10 routing (VXIpc only)
- Trigger input termination (VXIpc only)
- MITE EEPROM

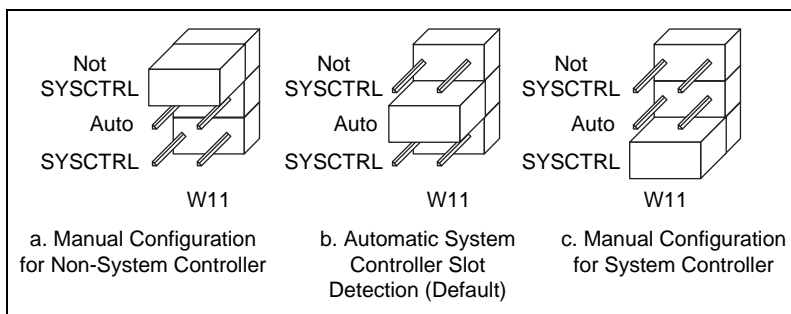
### VXI/VMEbus System Controller/Non-System Controller

The VXI/VMEpc 600 Series is configured at the factory to automatically detect if it is installed in Slot 0 of a VXIbus mainframe (or Slot 1 in a VMEbus chassis). With automatic System Controller slot detection, you can install the module into any VXI/VMEbus slot.

You can manually configure the VXI/VMEpc 600 Series for either System Controller or Non-System Controller operation by defeating the automatic-detection circuitry. Use the three-position jumper W11 to select automatic detection, System Controller, or Non-System Controller operation. Figure 3-4 shows these three settings.



**Caution** *Do not install a device configured for System Controller into another slot without first reconfiguring it to either Non-System Controller or automatic-detection configuration. Neglecting to do this could result in damage to the device, the VXI/VMEbus backplane, or both.*



**Figure 3-4.** System Controller Slot Configuration

When the VXI/VMEpc 600 Series is installed in Slot 0 of a VXI system or Slot 1 of a VME system, it becomes the VXI/VMEbus System Controller. In this role, it has VXI/VMEbus Data Transfer Bus Arbiter circuitry that accepts bus requests on all four VXI/VMEbus request levels, prioritizes the requests, and grants the bus to the highest priority requester. As VXI/VMEbus System Controller, the VXI/VMEpc 600 Series also drives the 16 MHz VXI/VMEbus system clock by an onboard 16 MHz oscillator.

- ◆ **VXIpc 600 Series Only**—As required by the VXIbus specification, the VXIpc 600 Series drives the 10 MHz signal CLK10 on a differential ECL output when installed in Slot 0. When not installed in Slot 0, the VXIpc 600 Series only receives the CLK10 signal.

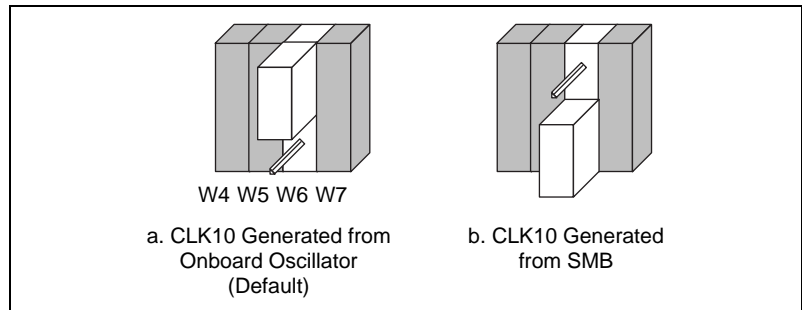
## VXIbus CLK10 Routing (VXIpc 600 Series Only)

When the VXIpc 600 Series is installed in Slot 0 of your mainframe, it supplies the VXIbus CLK10 signal. The VXIpc 600 Series can use two different sources to generate this signal: an onboard oscillator, or the external CLK SMB connector. Use jumper W6 to select these options, as shown in Figure 3-5.



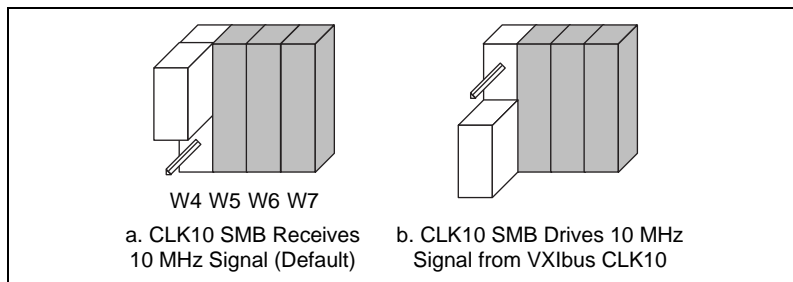
### Note

*Figures 3-5 through 3-8 each highlight one jumper in a block of four jumpers. The other three jumpers are grayed out to focus your attention to the specific jumper.*



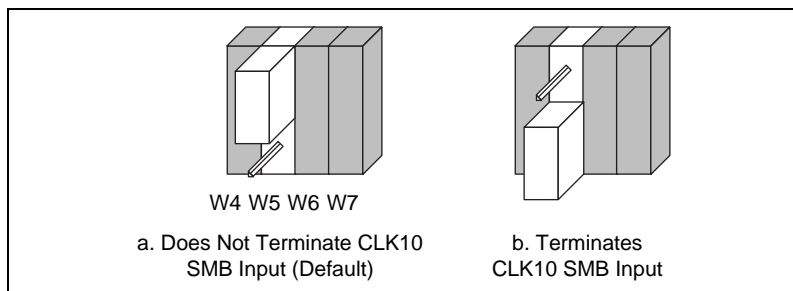
**Figure 3-5.** VXIbus CLK10 Routing

The VXIpc 600 Series can also be configured to drive the external CLK10 SMB from the VXIbus CLK10 signal. Jumper W4 controls whether the VXIpc 600 Series drives or receives the external CLK10 SMB. If you change the W4 setting to drive CLK10 out the external CLK10 SMB connector (Figure 3-6b), do not set W6 to source CLK10 to the backplane from the SMB; instead use the setting shown in Figure 3-5a.



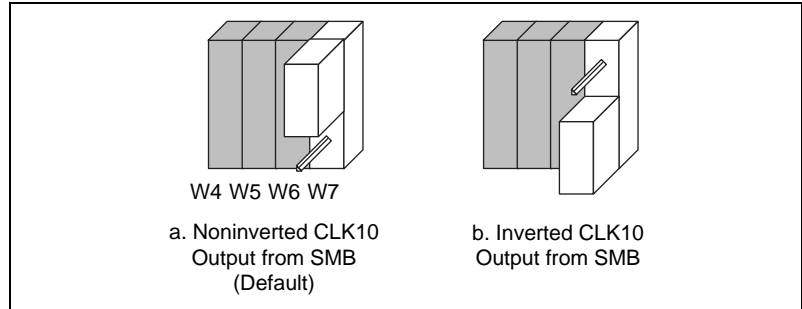
**Figure 3-6.** SMB CLK10 Direction

When jumper W4 is set so that the VXIpc-650 receives the SMB CLK10 signal, you have the option to add a  $50\ \Omega$  termination to the signal by setting W5. W5 is unused—its setting does not matter—when W4 is configured to drive the external CLK SMB signal. Figure 3-7 shows the settings for switch W5.



**Figure 3-7.** SMB CLK10 Termination

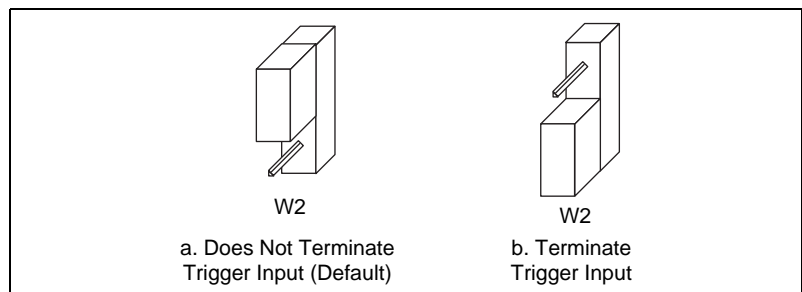
You can use an additional switch, W7, to control the polarity of the external CLK SMB signal when W4 is configured to drive it. W7 is unused—its setting does not matter—when W4 is configured to receive the external CLK SMB signal.



**Figure 3-8.** SMB CLK10 Polarity

## Trigger Input Termination (VXIpc 600 Series Only)

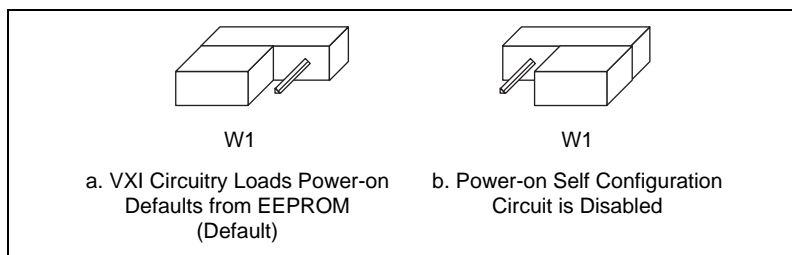
You can use jumper W2 to terminate the external trigger input SMB with 50  $\Omega$  to ground. Figure 3-9a shows the default setting for a non-terminated trigger input SMB. Use the setting of Figure 3-9b to terminate the trigger input SMB.



**Figure 3-9.** SMB Trigger Input Termination

## MITE EEPROM

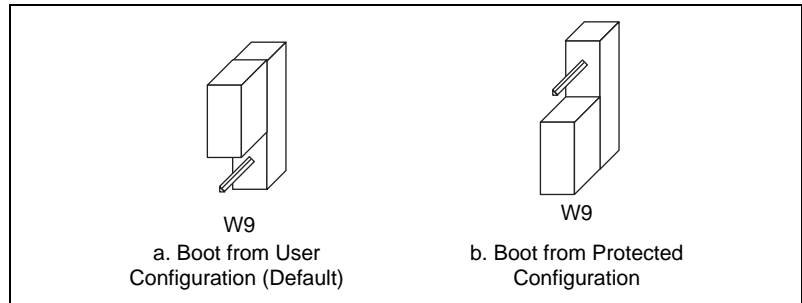
The VXI/VMEpc 600 Series has an onboard EEPROM, which stores default register values for the VXI/VME circuitry. These values are loaded when you power up the computer. These values read from the EEPROM tell the PCI interface of the VXI/VMEbus registers so that the VXI/VME interface is ready to respond to Resource Manager accesses within the required 5 s of SYSRST\* deasserting. You can use jumper W1 to disable this power-on self-configuration (POSC) circuit. Although this makes the VXI/VME circuitry unusable, it is sometimes helpful in debugging address and interrupt conflicts with add-in boards. In general, however, you should leave jumper W1 in its factory-default setting. Figure 3-10 shows the possible configurations for W1.



**Figure 3-10.** Power-on Self Configuration Status

The EEPROM is divided into two halves; one half is factory configured and one half is user configurable. Use jumper W9 to control the operation of the EEPROM. The setting of this jumper determines whether the VXI/VMEpc 600 Series boots off the factory-configured half or the user-modified settings. This is useful in the event that the user-configured half of the EEPROM becomes corrupted in such a way that the VXI/VMEpc 600 Series boots to an unusable state. In its default setting, the VXI/VMEpc 600 Series boots off the user-configurable half.

Figure 3-11 shows the configuration settings for EEPROM operation.



**Figure 3-11.** EEPROM Configuration

## How to Fix an Invalid EEPROM Configuration

The NI-VXI software includes a configuration utility you can use to edit the configuration of the VXI/VMEpc 600 Series. Use T&M Explorer under Windows 95/NT. Some of these settings are stored in files that are read by the NI-VXI software, while other settings are stored directly in the VXI/VMEpc 600 Series EEPROM. Certain EEPROM configurations can lock up your computer while it is booting up. Generally, only the size and location of the memory windows can cause your VXI/VMEpc 600 Series to lock up your system. For example, many PCI-based computers will not boot if a board in its system requests more memory space than the computer can allocate. If you encounter this situation you should reduce the size of the VXI/VMEpc 600 Series user window.

If this situation occurs after you change the configuration, perform the following steps to reconfigure the VXI/VMEpc 600 Series:

1. Turn off your computer.



**Warning** *To protect both yourself and the mainframe from electrical hazards, the mainframe should remain off until you are finished changing the settings on the VXI/VMEpc 600 Series.*

2. Change jumper W9 to the position shown in Figure 3-11b to restore the factory configuration.
3. Turn on the computer. The computer should boot this time because the factory-default configuration is being used to initialize the VXI/VMEpc 600 Series.
4. Run your software configuration utility to re-adjust the VXI/VMEpc 600 Series configuration.

5. After saving the configuration, exit Windows and turn off the computer.
6. Change jumper W9 to the default position, as shown in Figure 3-11a.
7. Turn on the computer. If the computer does not boot with this configuration, you will have to repeat these steps, modifying your configuration until a final configuration is reached.

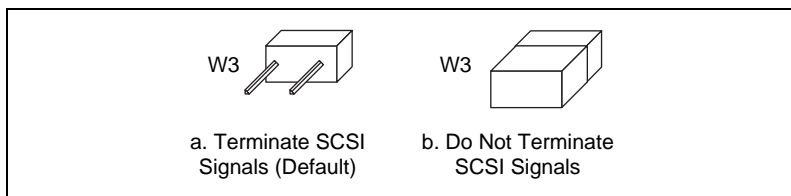
## Configuring the PC

This section describes how to configure the following options on the PC:

- SCSI termination
- System CMOS
- Ethernet power-on defaults

### SCSI Termination

The VXI/VMEpc 600 Series uses active termination on the UW-SCSI bus. Because the VXI/VMEpc 600 Series is always an end device, you should not need to disable the termination; however, for informational purposes Figure 3-12 shows the jumper settings for both enabled and disabled termination.



**Figure 3-12.** SCSI Termination

### System CMOS

The VXI/VMEpc-650 contains a backed-up memory used to store BIOS defaults and configuration information:

Follow this procedure to clear the CMOS contents:

1. Place the jumper as shown in Figure 3-13b to short the pins of W20, which is located on the CPU module.

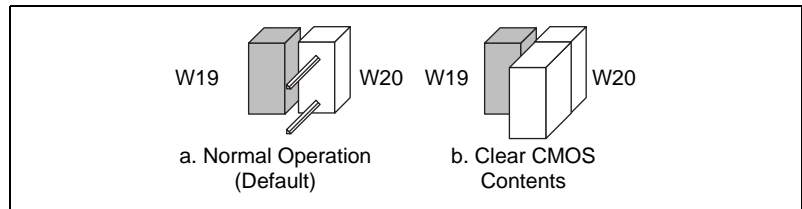


**Caution**

*Do not keep these two pins shorted because the CMOS memory cannot be sustained when the power is turned off in this state.*



2. Power-on the VXI/VMEpc-650. The screen should briefly appear, and then go black.
3. Power-off the VXI/VMEpc-650.
4. Remove the jumper as shown in Figure 3-13a to restore normal operation.



**Figure 3-13.** System CMOS

## Installing the VXI/VMEpc 600 Series

This section contains general installation instructions for the VXI/VMEpc 600 Series. Consult your VXI/VMEbus mainframe user manual or technical reference manual for specific instructions and warnings.

1. Plug in your mainframe before installing the VXI/VMEpc 600 Series. The power cord grounds the mainframe and protects it from electrical damage while you are installing the module.



**Warning** *To protect both yourself and the mainframe from electrical hazards, the mainframe should remain off until you are finished installing the VXI/VMEpc 600 Series module.*

2. Remove or open any doors or covers blocking access to the mainframe slots.



**Caution** *If the VXI/VMEpc 600 Series is not configured for automatic System Controller detection, be certain that the slot you select in your VXI/VMEbus mainframe matches the VXI/VMEpc 600 Series configuration as either a System Controller device or a Non-System Controller device. Installing the VXI/VMEpc 600 Series into a slot that does not correspond with the jumper setting can damage the VXI/VMEpc 600 Series, the VXI/VMEbus backplane, or both.*

3. Insert the VXI/VMEpc 600 Series in the slot you have selected by aligning the top and bottom of the module with the card-edge guides inside the mainframe. Slowly push the VXI/VMEpc 600 Series straight into the slot until its plug connectors are resting on the

backplane receptacle connectors. Using slow, evenly distributed pressure, press the module straight in until it seats in the expansion slot. The front panel of the VXI/VMEpc 600 Series should be even with the front panel of the mainframe.

4. Tighten the retaining screws on the top and bottom edges of the front panel.
5. Check the installation.
6. Connect the keyboard and mouse to the appropriate connectors. Use the keyboard adapter cable that you received with your kit to adapt AT-style keyboards to the VXI/VMEpc 600 Series mini-DIN connector.
7. Connect the VGA monitor video cable to the VGA connector.
8. Connect devices to ports as required by your system configuration. Some ports, such as the COM ports, have adapter cables that you can order from National Instruments.
9. Replace or close any doors or covers to the mainframe.

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# BIOS

This chapter contains information on the BIOS (Basic Input Output System), the low-level interface between the hardware and PC software that configures and tests your hardware at boot up. The BIOS has an easy-to-use graphical user interface you use to configure system aspects according to your needs.

## Entering BIOS Setup

---

To enter the BIOS setup program, perform the following steps:

1. Turn on or reboot the system. A screen appears with a series of diagnostic checks.
2. When **Hit <DEL> if you want to run SETUP** appears, press the <DEL> key to enter the BIOS setup program.
3. Choose options with the keyboard. Modify the settings to reflect system options.

## Default BIOS Setup Settings

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To restore the default settings while inside the BIOS setup program, select either **Auto Configuration with Optimal Settings** or **Auto Configuration with Fail-Safe Settings**.

Select the Optimal settings if you want to get maximum performance from the VXI/VMEpc 600 Series. Fail Safe settings are more conservative settings.

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# Specifications

This appendix describes the environmental, electrical, and mechanical specifications of the VXI/VMEpc 600 Series. Unless otherwise specified, these specifications apply to all models in the VXI/VMEpc 600 Series.

## Requirements

---

| Characteristic             | Specification                |
|----------------------------|------------------------------|
| VXibus Configuration Space | 64 KB                        |
| A24 or A32 Space           | 16 KB minimum (programmable) |

## Electrical

---

| Voltage (V) | Current (A) |                 |
|-------------|-------------|-----------------|
|             | Typical     | Maximum (Fused) |
| +5          | 6.5 A       | 12 A            |
| −5.2        | 224.5 mA    | 2 A             |
| −2          | 67.2 mA     | 2 A             |
| +12         | 112.6 mA    | 2 A             |
| −12         | 2.43 mA     | 2 A             |

## Physical

---

| Characteristic    | Specification                            |
|-------------------|--|
| Size              | Two-slot VXI/VMEbus B-size module        |
| Board Dimensions  | 233.35 by 160 by 1.6 mm                  |
| Weight            | 2.5 lb typical<br>(16 MB DRAM installed) |
| Slot Requirements | Two VXI/VME B-size slots                 |
| Compatibility     | Fully compatible with VXI Specification  |
| VXI Keying Class  | Class 1 TTL                              |
| MTBF              | 112,000 hours                            |

## Environmental

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| Characteristic    | Specification   |
|-------------------|---|
| Temperature       | 0° to 50° C functional;<br>–20° to 70° C storage<br>Meets IEC 60068-2-1, 2  |
| Relative Humidity | 10% to 90% noncondensing, functional<br>Meets IEC 60068-2-3   |
| EMI               | FCC Class A verified, EC verified   |
| Random Vibration  | Functional: 5 to 150 Hz @ .01 A.S.D., 1.204 g <sub>RMS</sub><br>Survival: 10 to 500 Hz @ .02 A.S.D., 3.130 g <sub>RMS</sub><br>Meets IEC 60068-2-34 |
| Sine Vibration    | 10 to 60 Hz @ .15 mm displacement,<br>60 to 500 Hz @ 2 g, survival<br>Meets IEC 60068-2-6   |
| Functional Shock  | Half-sine shock pulse (11 ms duration, 30 g peak)<br>Meets IEC 60068-2-27   |

# VMEbus Capability Codes

| Capability Code                      | Description                                     |
|--------------------------------------|---|
| A32, A24, A16 (master)               | VMEbus master A32, A24, and A16 addressing      |
| A32, A24, A16 (slave)                | VMEbus slave A32, A24, and A16 addressing       |
| D64, D32, D16, D08(EO) (master)      | VMEbus master D64, D32, D16, and D08 data sizes |
| D64, D32, D16, D08(EO) (slave)       | VMEbus slave D64, D32, D16, and D08 data sizes  |
| BLT, MBLT (master)                   | VMEbus master block and D64 transfers           |
| BLT, MBLT (slave)                    | VMEbus slave block and D64 transfers            |
| RMW (master)                         | VMEbus master read/modify/write transfers       |
| RMW (slave)                          | VMEbus slave read/modify/write transfers        |
| RETRY (master)                       | VMEbus master retry support                     |
| RETRY (slave)                        | VMEbus slave retry support                      |
| FSD                                  | First slot detector                             |
| SCON                                 | VMEbus System Controller (Automatic Detection)  |
| PRI, RRS                             | Prioritized or Round Robin Select arbiter       |
| ROR, FAIR                            | Release on Request and FAIR bus requester       |
| IH(7-1)                              | Interrupt handler for levels 7-1                |
| I(7-1)                               | Interrupt requester for levels 7-1              |
| D32, D16, D08(O) (Interrupt Handler) | VMEbus D32, D16, D08(O) interrupt handler       |

| Capability Code                   | Description  |
|-----------------------------------|--|
| D32, D16, D08(O)<br>(Interrupter) | VMEbus D32, D16, D08(O) interrupter                      |
| ROAK, RORA                        | Release on Acknowledge or Register<br>Access interrupter |
| BTO(x)                            | VMEbus bus timer (programmable limit)                    |
| LOCK                              | Can lock the VMEbus for indivisible<br>transfers         |

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# LED Indicators

This appendix describes how to read the LEDs on the front panel to interpret the status of the VXI/VMEpc 600 Series.

## VXIbus Interface Status LEDs

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The VXIbus interface status LEDs are located at the top of the module and include four LEDs: **FAIL**, **SYSF**, **ONLINE**, and **TEST**. They indicate the various stages of initialization that occur as the VXI/VMEpc 600 Series boots. The following paragraphs describe each LED.

### SYSF LED

The **SYSF** LED is lit when the VXI/VMEbus SYSFAIL signal is asserted. It does not necessarily indicate that the VXI/VMEpc 600 Series is asserting SYSFAIL, only that there is a device in the system asserting SYSFAIL.

### FAIL LED

The **FAIL** LED is lit when the VXI/VMEpc 600 Series is driving the SYSFAIL signal. The VXI/VMEpc 600 Series asserts SYSFAIL when the PASSED bit in its VXIbus status register is clear. The PASSED bit is set by the power-on self configuration circuitry (POSC) when it has completed initializing the VXI/VMEbus interface.

### ONLINE LED

The **ONLINE** LED is lit when the Resource Manager has successfully completed and the VXI/VMEbus interface is ready for application programs.

### TEST LED

The **TEST** LED is lit when the power-on self configuration circuitry is configuring the VXI/VMEbus interface.



## LEDs and System Startup Cycle

Table B-1 shows a system startup cycle and possible points of failure, up to and including the state in which the **ONLINE** LED is asserted.

**Table B-1.** LEDs and System Startup Status

| Step | LEDs Lit                    | Status  | Possible Problem if VXI/VMEpc 600 Fails   |
|------|-----------------------------|---|---|
| 1    | None                        | Machine just turned on.   | The VXI/VMEpc 600 Series is not receiving power.  |
| 2    | <b>FAIL,</b><br><b>SYSF</b> | Now asserting SYSFAIL because VXI/VMEbus interface has not been initialized yet.  | Power-on self configuration (POSC) cannot execute because of problems with system reset or because the POSCEN switch is incorrectly configured. |
| 3    | <b>FAIL,</b><br><b>TEST</b> | VXI/VMEbus interface is being initialized by MITE power-on self configuration (POSC) circuitry.                         | POSC has stalled.   |
| 4    | <b>TEST</b>                 | POSC circuitry has initialized VXI/VMEbus interface, setting PASSED and DONE bits.                                      | POSC stalled before clearing the <b>TEST</b> LED.   |
| 5    | None                        | POSC cycles are complete. VXI port is ready to respond to Resource Manager inquiries.                                   | POSC completed successfully; however, the Resource Manager either hung or was not executed.   |
| 6    | <b>ONLINE</b>               | Resource Manager has been executed, indicating that the VXI software can now communicate with the VXI/VMEbus circuitry. | Resource Manager interface initialized successfully.  |

If either the **SYSF** or **FAIL** LED remains lit, perform the following steps:

1. Power off the mainframe.
2. Remove all other modules from the mainframe.
3. Make sure that the VXI/VMEpc 600 Series jumper settings are correct.
4. Make sure that the VXI/VMEpc 600 Series is seated properly in the mainframe.
5. Power on the mainframe and observe whether the **SYSF** and **FAIL** LEDs become unlit some time before the operating system boots.

## Board Access LEDs

---

The board access LEDs—**ACC** and **DRV**—indicate when board resources have been accessed. The following paragraphs describe these LEDs.

### ACC LED

When lit, the **ACC** LED indicates that the VXI/VMEpc 600 Series MODID line is asserted or that another VXI/VMEbus master is accessing VXI/VMEbus shared registers or shared memory.

### DRV LED

The **DRV** LED light indicates that an access to the internal hard disk drive is occurring.

## Ethernet LEDs

---

The Ethernet LEDs (**RX**, **TX**, **LNK**, and **100B-T**) indicate the status of the Ethernet interface on the VXI/VMEpc 600 Series.

### RX LED

The **RX** LED lights when the Ethernet interface is receiving a packet.

### TX LED

The **TX** LED lights when the Ethernet interface is transmitting a packet.

### LNK LED

The **LNK** LED indicates link status, in this case that the controller is connected to a valid Ethernet port.

## **100B-T**

The **100B-T** LED indicates that the current Ethernet connection is at 100 Mbits/s when lit.



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# Front Panel and Connectors

This appendix describes the front panel and connectors on the VXI/VMEpc 600 Series. This material contains the information relevant to VXIplug&play Specification VPP-8, *VXI Module/Mainframe to Receiver Interconnection*.



## Note

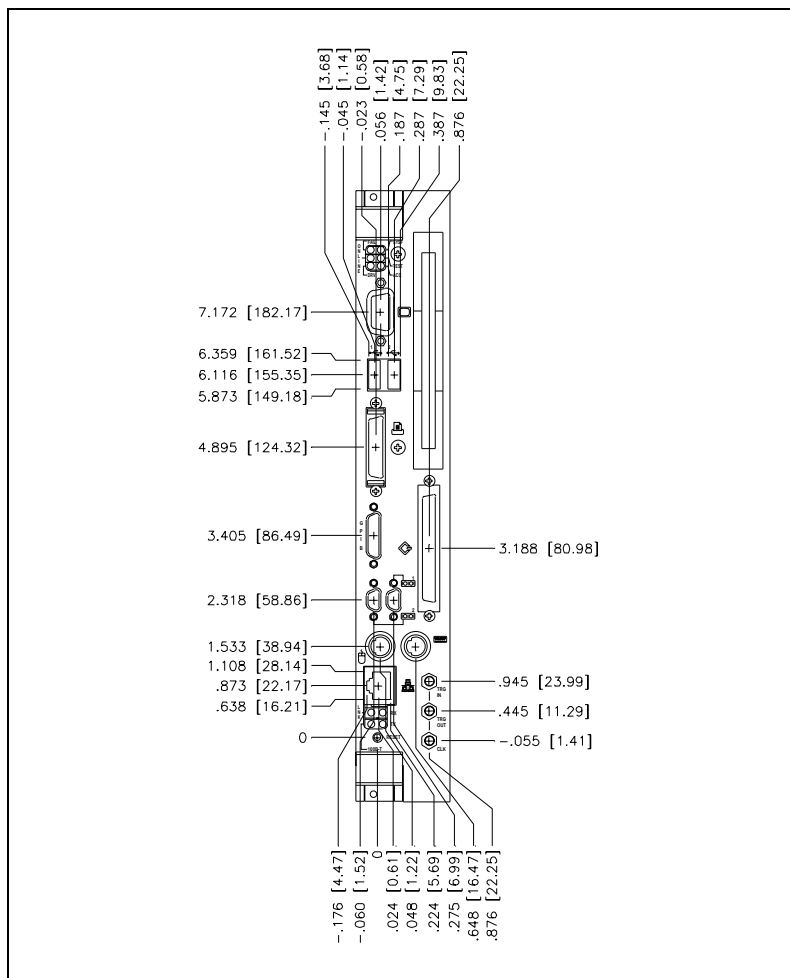
*The illustrations in this appendix show the mating face of the connectors. An asterisk (\*) after a signal name indicates that the signal is active low.*

The VXI/VMEpc 600 Series has the following front panel connectors:

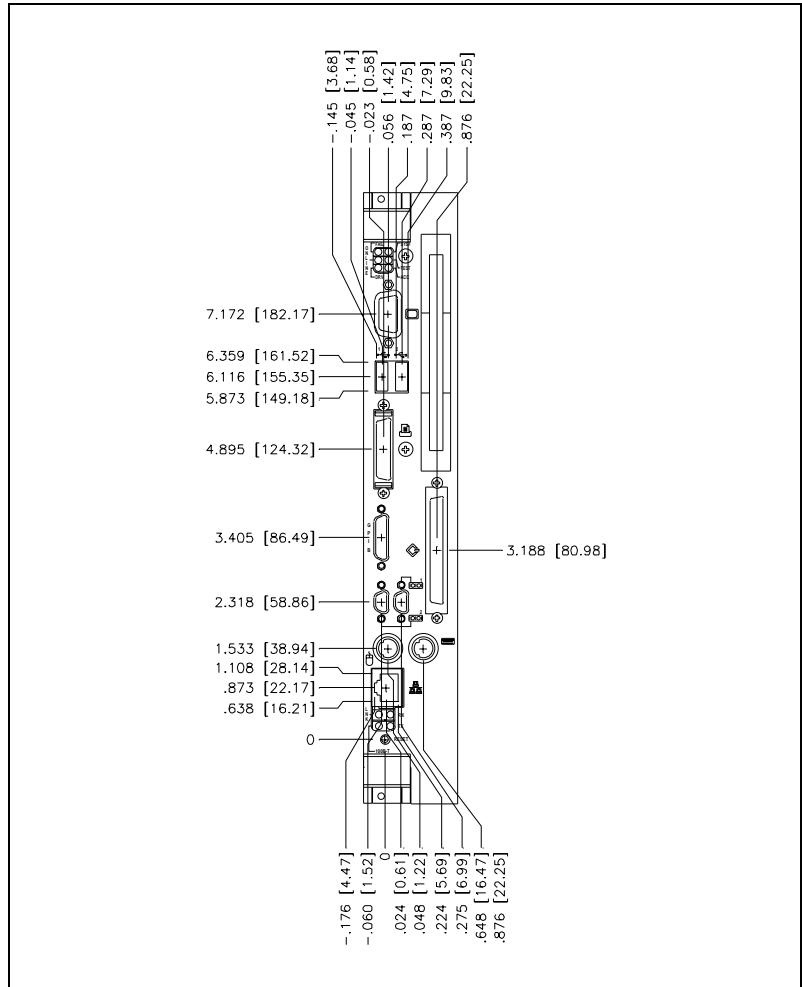
- Two RS-232 Serial
- Extended Capabilities Parallel (ECP)
- SVGA Controller
- IEEE 488.2
- RJ-45 Ethernet
- UW-SCSI
- External Clock (VXIpc-650 only)
- Trigger Output (VXIpc-650 only)
- Trigger Input (VXIpc-650 only)
- PS/2-Style Keyboard
- PS/2-Style Mouse
- Two USB

# Front Panel

Figure C-1 shows the front panel layout of the VXIpc-650, and Figure C-2 shows the layout of the VMEpc-650. The drawings show dimensions relevant to key elements on the front panel. Dimensions are shown in inches and millimeters, with millimeter dimensions in square brackets. The front panel thickness for all models in the VXI/VMEpc 600 Series is 2.49 mm (0.098 in.).



**Figure C-1.** VXIpc-650 Front Panel Layout and Dimensions

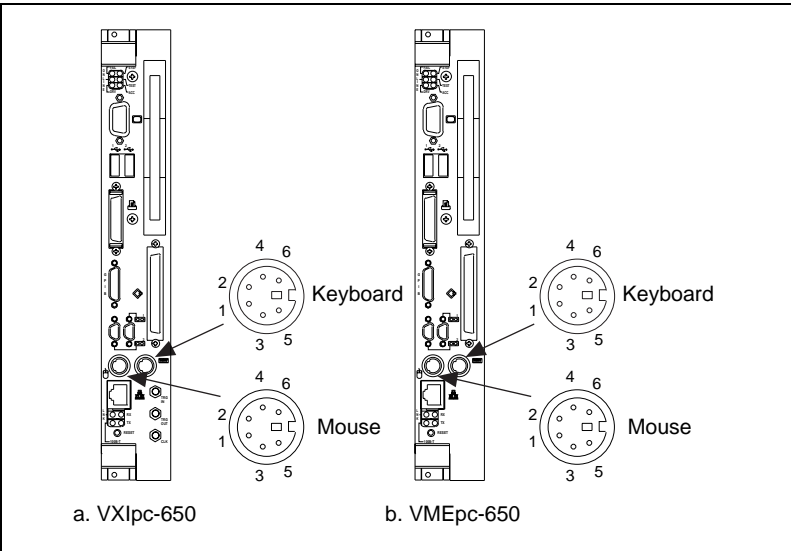


**Figure C-2.** VMEpc-650 Front Panel Layout and Dimensions

# Keyboard and Mouse

Figure C-3 shows the location and pinouts for the keyboard and mouse connectors on the VXI/VMEpc 600 Series. Table C-1 gives the name and description for the keyboard and mouse connector signals.

Amp manufactures a mating connector with part numbers 212437-4 (housing), 212435-7 (ferrule), and 66735-4 (pin contact).



**Figure C-3.** Keyboard and Mouse Connectors Location and Pinout

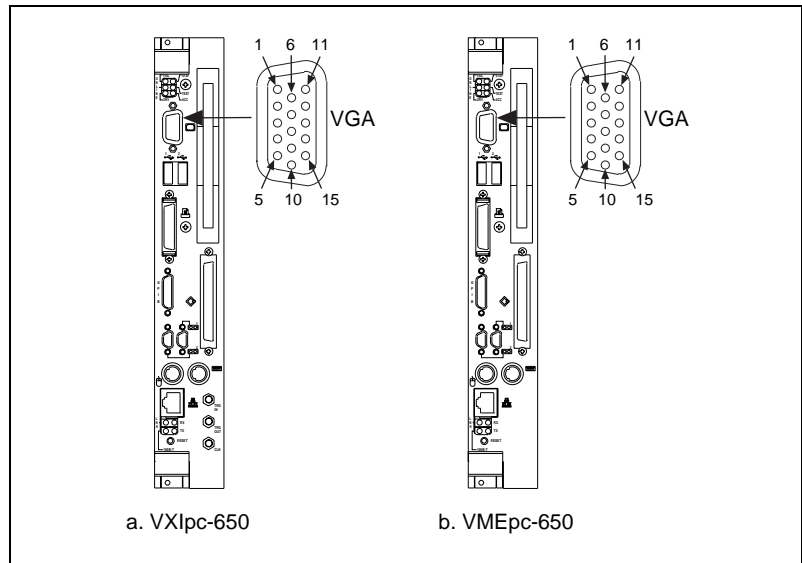
**Table C-1.** Keyboard and Mouse Connector Signals

| Pin | Signal Name | Signal Description |
|-----|-------------|--------------------|
| 1   | DATA        | Data               |
| 2   | NC          | Not Connected      |
| 3   | GND         | Ground             |
| 4   | +5V         | +5 volts           |
| 5   | CLK         | Clock              |
| 6   | NC          | Not Connected      |

# VGA

Figure C-4 shows the location and pinouts for the VGA connector on the VXI/VMEpc 600 Series. Table C-2 gives the name and description for the VGA connector signals.

Amp manufactures a mating connector with part numbers 748364-1 (housing) and 748333-2 (pin contact).



**Figure C-4.** VGA Connector Location and Pinout

**Table C-2.** VGA Connector Signals

| Pin | Signal Name | Signal Description |
|-----|-------------|--------------------|
| 1   | R           | Red                |
| 2   | G           | Green              |
| 3   | B           | Blue               |
| 4   | NC          | Not Connected      |
| 5   | GND         | Ground             |
| 6   | GND         | Ground             |
| 7   | GND         | Ground             |
| 8   | GND         | Ground             |



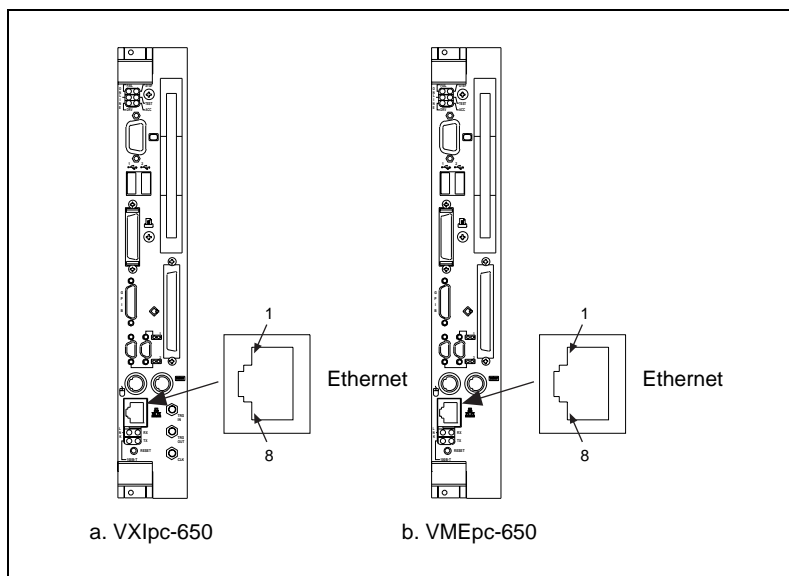
**Table C-2.** VGA Connector Signals (Continued)

| Pin | Signal Name | Signal Description |
|-----|-------------|--------------------|
| 9   | NC          | Not Connected      |
| 10  | GND         | Ground             |
| 11  | NC          | Not Connected      |
| 12  | SD          | Serial Data        |
| 13  | HSync       | Horizontal Sync    |
| 14  | VSynC       | Vertical Sync      |
| 15  | SC          | Serial Clock       |

## Ethernet

Figure C-5 shows the location and pinouts for the Ethernet connector on the VXI/VMEpc 600 Series. Table C-3 gives the name and description for the Ethernet connector signals.

Amp manufactures a mating connector, part number 554739-1.

**Figure C-5.** Ethernet Connector Location and Pinout

**Table C-3.** Ethernet Connector Signals

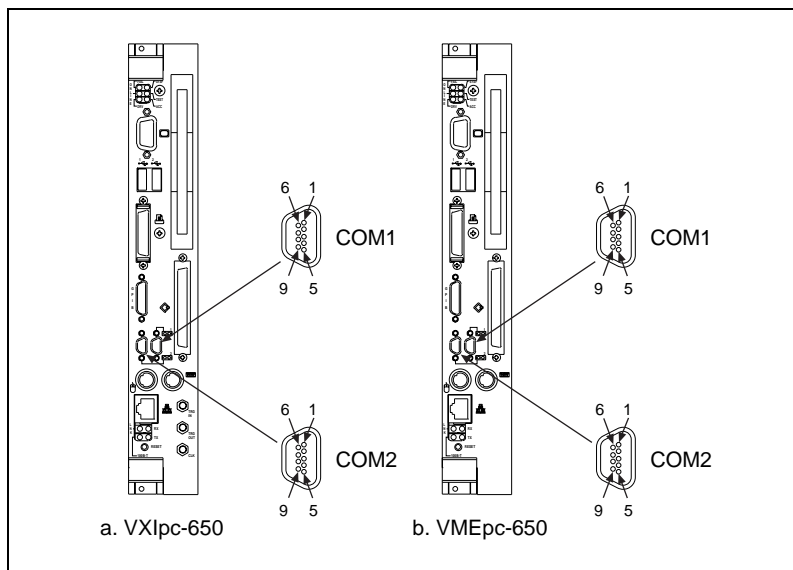
| Pin | Signal Description      |
|-----|-------------------------|
| 1   | Differential Transmit + |
| 2   | Differential Transmit – |
| 3   | Differential Receive +  |
| 4   | NC                      |
| 5   | NC                      |
| 6   | Differential Receive –  |
| 7   | NC                      |
| 8   | NC                      |

## COM1 and COM2

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Figure C-6 shows the location and pinouts for the COM1 and COM2 connectors on the VXI/VMEpc 600 Series. Table C-4 gives the name and description for the COM1 and COM2 connector signals.

ITT Cannon manufactures a serial port mating connector, part number MDSM-9SC-Z11, for the COM1 and COM2 connectors.



**Figure C-6.** COM1 and COM2 Connectors Location and Pinout

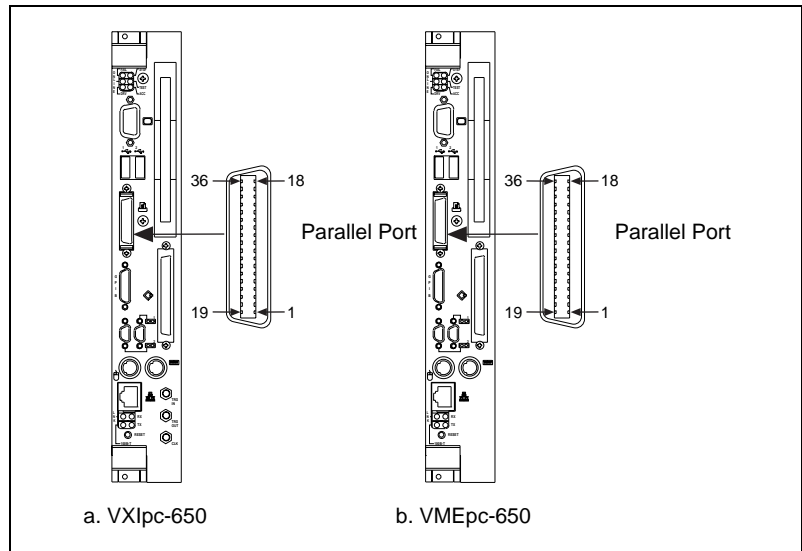
**Table C-4.** COM1 and COM2 Connector Signals

| Pin | Signal Name | Signal Description  |
|-----|-------------|---------------------|
| 1   | DCD*        | Data Carrier Detect |
| 2   | RXD*        | Receive Data        |
| 3   | TXD*        | Transmit Data       |
| 4   | DTR*        | Data Terminal Ready |
| 5   | GND         | Ground              |
| 6   | DSR*        | Data Set Ready      |
| 7   | RTS*        | Ready to Send       |
| 8   | CTS*        | Clear to Send       |
| 9   | RI*         | Ring Indicator      |

# Parallel Port

Figure C-7 shows the location and pinouts for the IEEE-1284 connector on the VXI/VMEpc 600 Series. Table C-5 gives the name and description for the IEEE-1284 connector signals.

Amp manufactures a parallel port compatible connector, part number 2-175677-5.



**Figure C-7.** Parallel Port Connector Location and Pinout

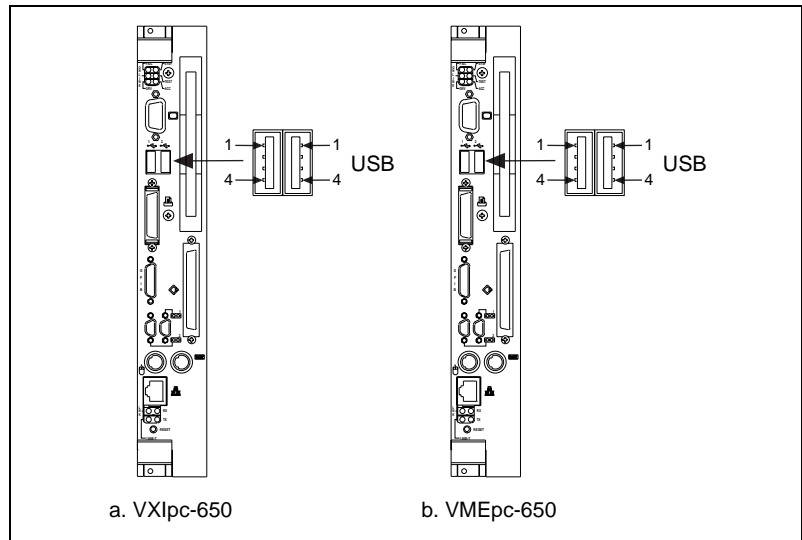
**Table C-5.** Parallel Port Connector Signals

| Pin   | Signal Name | Signal Description |
|-------|-------------|--------------------|
| 1     | BUSY*       | Device Busy        |
| 2     | SLCTIN*     | Select Input       |
| 3     | ACK*        | Acknowledge        |
| 4     | FAULT*      | Fault              |
| 5     | ERROR       | Error              |
| 6     | PD0         | Data Bit 0         |
| 7     | PD1         | Data Bit 1         |
| 8     | PD 2        | Data Bit 2         |
| 9     | PD3         | Data Bit 3         |
| 10    | PD4         | Data Bit 4         |
| 11    | PD5         | Data Bit 5         |
| 12    | PD6         | Data Bit 6         |
| 13    | PD7         | Data Bit 7         |
| 14    | INIT*       | Initialize Printer |
| 15    | STROBE*     | Strobe             |
| 16    | SLCT        | Select             |
| 17    | AUTOFD      | Auto Line Feed     |
| 18    | +5V         | +5 Volts           |
| 19-35 | GND         | Ground             |
| 36    | NC          | Not Connected      |

# Universal Serial Bus

Figure C-8 shows the location and pinouts for the two Universal Serial Bus (USB) connectors on the VXI/VMEpc 600 Series. Table C-6 gives the name and description for the USB connector signals.

Amp manufactures a mating connector, part number 787633.



**Figure C-8.** USB Connectors Location and Pinout

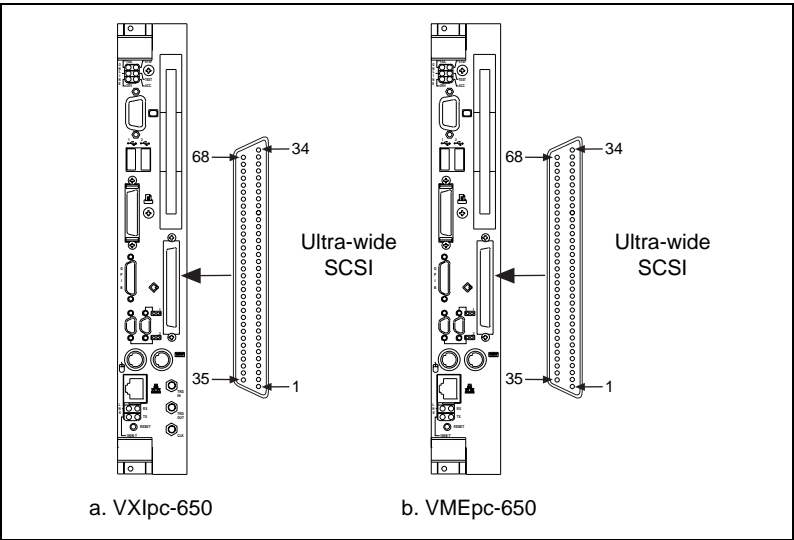
**Table C-6.** USB Connector Signals

| Pin | Signal Name | Signal Description |
|-----|-------------|--------------------|
| 1   | VCC         | Cable Power (+5 V) |
| 2   | -Data       | USB Data-          |
| 3   | +Data       | USB Data+          |
| 4   | GND         | Ground             |

# SCSI

Figure C-9 shows the location and pinouts for the SCSI connector on the VXI/VMEpc 600 Series. Table C-7 gives the name and description for the SCSI connector signals.

Amp manufactures a SCSI compatible connector, part number 749111-6, with shielded enclosure 750752-1.



**Figure C-9.** SCSI Connector Location and Pinout

**Table C-7.** 16-Bit Wide SCSI-3 “P” (Primary) Connector Pinout (Single Ended)

| SCSI Signal | High Density 68-Pin Connector | SCSI Signal | High Density 68-Pin Connector |
|-------------|-------------------------------|-------------|-------------------------------|
| GND         | 1                             | DB(12)*     | 35                            |
| GND         | 2                             | DB(13)*     | 36                            |
| GND         | 3                             | DB(14)*     | 37                            |
| GND         | 4                             | DB(15)*     | 38                            |
| GND         | 5                             | DP1         | 39                            |
| GND         | 6                             | DB(0)*      | 40                            |

**Table C-7.** 16-Bit Wide SCSI-3 “P” (Primary) Connector Pinout  
(Single Ended) (Continued)

| SCSI Signal | High Density<br>68-Pin<br>Connector | SCSI Signal | High Density<br>68-Pin<br>Connector |
|-------------|-------------------------------------|-------------|-------------------------------------|
| GND         | 7                                   | DB(1)*      | 41                                  |
| GND         | 8                                   | DB(2)*      | 42                                  |
| GND         | 9                                   | DB(3)*      | 43                                  |
| GND         | 10                                  | DB(4)*      | 44                                  |
| GND         | 11                                  | DB(5)*      | 45                                  |
| GND         | 12                                  | DB(6)*      | 46                                  |
| GND         | 13                                  | DB(7)*      | 47                                  |
| GND         | 14                                  | DP0         | 48                                  |
| GND         | 15                                  | GND         | 49                                  |
| GND         | 16                                  | GND         | 50                                  |
| TERMPWR     | 17                                  | TERMPWR     | 51                                  |
| TERMPWR     | 18                                  | TERMPWR     | 52                                  |
| RSRVD       | 19                                  | RSRVD       | 53                                  |
| GND         | 20                                  | GND         | 54                                  |
| GND         | 21                                  | ATN*        | 55                                  |
| GND         | 22                                  | GND         | 56                                  |
| GND         | 23                                  | BSY*        | 57                                  |
| GND         | 24                                  | ACK*        | 58                                  |
| GND         | 25                                  | RST*        | 59                                  |
| GND         | 26                                  | MSG*        | 60                                  |
| GND         | 27                                  | SEL*        | 61                                  |
| GND         | 28                                  | C/D*        | 62                                  |
| GND         | 29                                  | REQ*        | 63                                  |
| GND         | 30                                  | I/O*        | 64                                  |



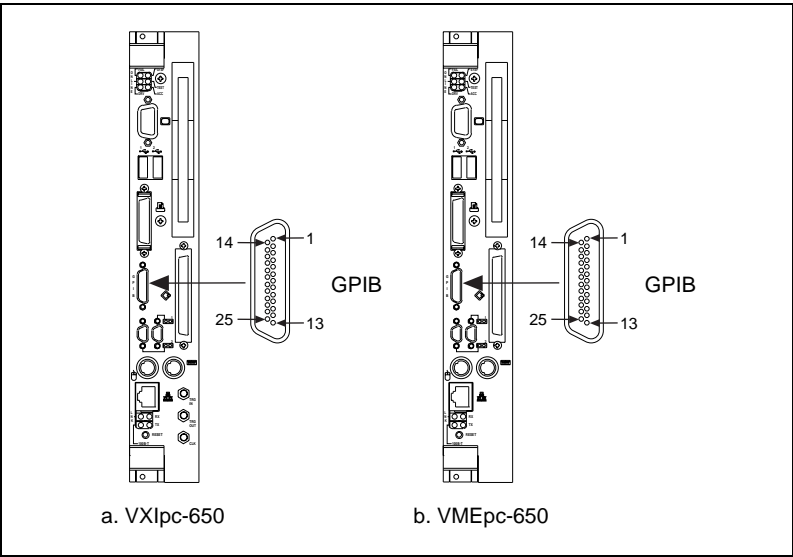
**Table C-7.** 16-Bit Wide SCSI-3 “P” (Primary) Connector Pinout  
(Single Ended) (Continued)

| SCSI Signal | High Density<br>68-Pin<br>Connector | SCSI Signal | High Density<br>68-Pin<br>Connector |
|-------------|-------------------------------------|-------------|-------------------------------------|
| GND         | 31                                  | DB(8)*      | 65                                  |
| GND         | 32                                  | DB(9)*      | 66                                  |
| GND         | 33                                  | DB(10)*     | 67                                  |
| GND         | 34                                  | DB(11)*     | 68                                  |

# **GPIO (IEEE-488.2)**

Figure C-10 shows the location and pinouts for the GPIO connector on the VXI/VMEpc 600 Series. Table C-8 gives the name and description for the GPIO connector signals.

ITT Cannon manufactures a GPIO mating connector, part number MDSM-255C-Z11.



**Figure C-10.** GPIO Connector Location and Pinout

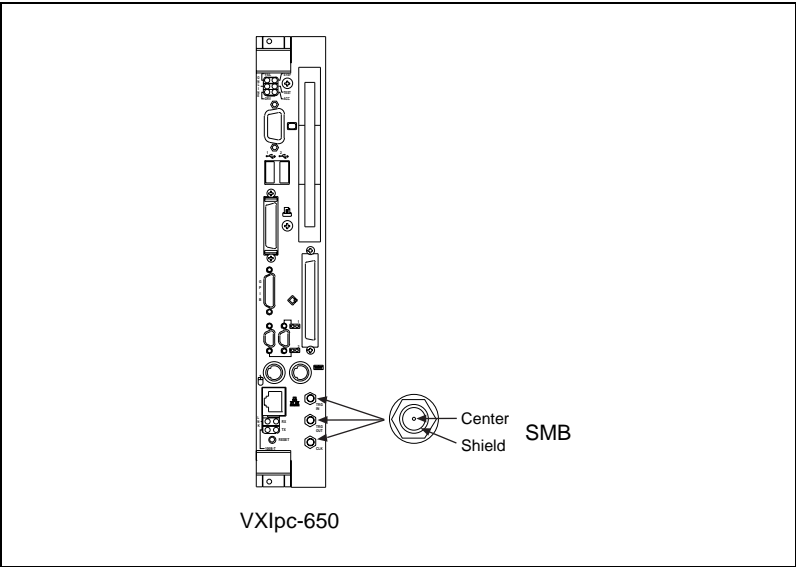
**Table C-8.** GPIB Connector Signals

| <b>Pin</b> | <b>Signal Name</b> | <b>Signal Description</b> |
|------------|--------------------|---------------------------|
| 1          | DIO1*              | Data Bit 1                |
| 2          | DIO2*              | Data Bit 2                |
| 3          | DIO3*              | Data Bit 3                |
| 4          | DIO4*              | Data Bit 4                |
| 5          | EOI*               | End or Identify           |
| 6          | DAV*               | Data Valid                |
| 7          | NRFD*              | Not Ready for Data        |
| 8          | NDAC*              | Not Data Accepted         |
| 9          | IFC*               | Interface Clear           |
| 10         | SRQ*               | Service Request           |
| 11         | ATN*               | Attention                 |
| 12         | SHIELD             | Chassis ground            |
| 13         | DIO5*              | Data Bit 5                |
| 14         | DIO6*              | Data Bit 6                |
| 15         | DIO7*              | Data Bit 7                |
| 16         | DIO8*              | Data Bit 8                |
| 17         | REN*               | Remote Enable             |
| 18-25      | GND                | Logic Ground              |

# External SMBs (VXIpc 600 Series Only)

Figure C-11 shows the location and pinouts for the SMB connectors on the VXIpc 600 Series. The SMB connectors are used for an external clock signal and TTL trigger input and output. Table C-9 gives the name and description for the SMB connector signals. Also see Table C-10 for a description of the signal characteristics for the SMB connections.

Amp manufactures an SMB mating connector, part number 1-413985-0.



**Figure C-11.** SMB Connectors Location and Pinout

**Table C-9.** SMB Connector Signals

| Pin    | Signal Description          |
|--------|-----------------------------|
| Center | TTL Trigger or Clock Signal |
| Shield | Ground                      |

# Signal Characteristics

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Refer to the relevant standard for the signal characteristics for VGA, SCSI, Ethernet, keyboard, mouse, parallel, serial, and GPIB.

Table C-10 shows the signal characteristics for the SMB connections.

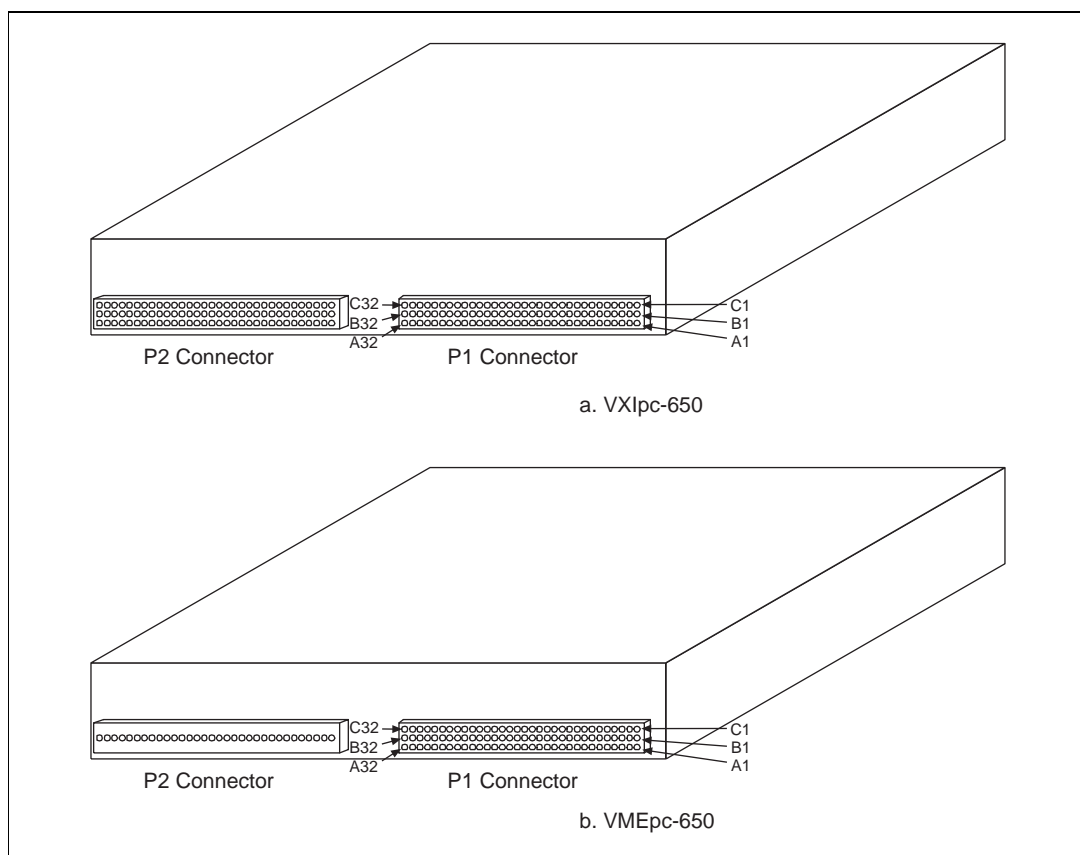
**Table C-10.** Signal Characteristics for SMB Connections

| Signal                         | Voltage Range | Maximum Current | Frequency Range |
|--------------------------------|---------------|-----------------|-----------------|
| SMB (TRIG out, CLK out)        | 0 to 3.4 V    | 200 mA          | DC-10 MHz       |
| SMB (TRIG in)                  | 0 to 5 V      | 100 mA*         | DC-10 MHz       |
| * with 50 $\Omega$ termination |               |                 |                 |

## VXIbus P1 and P2

Figure C-12 shows the location and pinouts for the VXI/VMEbus connectors on the VXI/VMEpc 600 Series. Notice that the P2 connector is different between the VXI and VME versions. The VME P2 connector connects only to Row B of the P2 connector.

Table C-11 gives the name and description for the VXI/VMEbus P1 connector signals. Table C-12 gives the name and description for the VXIbus P2 connector signals. Table C-13 describes the P2 connector signal assignments on the VMEpc 600 Series.



**Figure C-12.** VXIbus Connectors Location and Pinout

**Table C-11.** VXI/VMEbus P1 Connector Signals

| Pin | Row C     | Row B         | Row A    |
|-----|-----------|---------------|----------|
| 1   | D08       | BBSY*         | D00      |
| 2   | D09       | BCLR*         | D01      |
| 3   | D10       | ACFAIL*       | D02      |
| 4   | D11       | BG0IN*        | D03      |
| 5   | D12       | BG0OUT*       | D04      |
| 6   | D13       | BG1IN*        | D05      |
| 7   | D14       | BG1OUT*       | D06      |
| 8   | D15       | BG2IN*        | D07      |
| 9   | GND       | BG2OUT*       | GND      |
| 10  | SYSFAIL*  | BG3IN*        | SYSCLK   |
| 11  | BERR*     | BG3OUT*       | GND      |
| 12  | SYSRESET* | BR0*          | DS1*     |
| 13  | LWORD*    | BR1*          | DS0*     |
| 14  | AM5       | BR2*          | WRITE*   |
| 15  | A23       | BR3*          | GND      |
| 16  | A22       | AM0           | DTACK*   |
| 17  | A21       | AM1           | GND      |
| 18  | A20       | AM2           | AS*      |
| 19  | A19       | AM3           | GND      |
| 20  | A18       | GND           | IACK*    |
| 21  | A17       | Not Connected | IACKIN*  |
| 22  | A16       | Not Connected | IACKOUT* |
| 23  | A15       | GND           | AM4      |
| 24  | A14       | IRQ7*         | A07      |
| 25  | A13       | IRQ6*         | A06      |
| 26  | A12       | IRQ5*         | A05      |
| 27  | A11       | IRQ4*         | A04      |

**Table C-11.** VXI/VMEbus P1 Connector Signals (Continued)

| Pin | Row C | Row B         | Row A |
|-----|-------|---------------|-------|
| 28  | A10   | IRQ3*         | A03   |
| 29  | A09   | IRQ2*         | A02   |
| 30  | A08   | IRQ1*         | A01   |
| 31  | +12 V | Not Connected | –12 V |
| 32  | +5 V  | +5 V          | +5 V  |

**Table C-12.** VXIbus P2 Connector Signals

| Pin | Row C         | Row B  | Row A   |
|-----|---------------|--------|---------|
| 1   | CLK10+        | +5 V   | ECLTRG0 |
| 2   | CLK10–        | GND    | –2 V    |
| 3   | GND           | Retry* | ECLTRG1 |
| 4   | –5.2 V        | A24    | GND     |
| 5   | Not Connected | A25    | MODID12 |
| 6   | Not Connected | A26    | MODID11 |
| 7   | GND           | A27    | –5.2 V  |
| 8   | Not Connected | A28    | MODID10 |
| 9   | Not Connected | A29    | MODID09 |
| 10  | GND           | A30    | GND     |
| 11  | Not Connected | A31    | MODID08 |
| 12  | Not Connected | GND    | MODID07 |
| 13  | –2 V          | +5 V   | –5.2 V  |
| 14  | Not Connected | D16    | MODID06 |
| 15  | Not Connected | D17    | MODID05 |
| 16  | GND           | D18    | GND     |
| 17  | Not Connected | D19    | MODID04 |
| 18  | Not Connected | D20    | MODID03 |
| 19  | –5.2 V        | D21    | –5.2 V  |

**Table C-12.** VXIbus P2 Connector Signals (Continued)

| Pin | Row C         | Row B | Row A         |
|-----|---------------|-------|---------------|
| 20  | Not Connected | D22   | MODID02       |
| 21  | Not Connected | D23   | MODID01       |
| 22  | GND           | GND   | GND           |
| 23  | TTLTRG1*      | D24   | TTLTRG0*      |
| 24  | TTLTRG3*      | D25   | TTLTRG2*      |
| 25  | GND           | D26   | +5 V          |
| 26  | TTLTRG5*      | D27   | TTLTRG4*      |
| 27  | TTLTRG7*      | D28   | TTLTRG6*      |
| 28  | GND           | D29   | GND           |
| 29  | Not Connected | D30   | Not Connected |
| 30  | GND           | D31   | MODID00       |
| 31  | Not Connected | GND   | GND           |
| 32  | Not Connected | +5 V  | Not Connected |

**Table C-13.** VMEbus P2 Connector Signals

| Pin | Row C         | Row B  | Row A         |
|-----|---------------|--------|---------------|
| 1   | Not Connected | +5 V   | Not Connected |
| 2   | Not Connected | GND    | Not Connected |
| 3   | Not Connected | Retry* | Not Connected |
| 4   | Not Connected | A24    | Not Connected |
| 5   | Not Connected | A25    | Not Connected |
| 6   | Not Connected | A26    | Not Connected |
| 7   | Not Connected | A27    | Not Connected |
| 8   | Not Connected | A28    | Not Connected |
| 9   | Not Connected | A29    | Not Connected |
| 10  | Not Connected | A30    | Not Connected |



**Table C-13.** VMEbus P2 Connector Signals (Continued)

| <b>Pin</b> | <b>Row C</b>  | <b>Row B</b> | <b>Row A</b>  |
|------------|---------------|--------------|---------------|
| 11         | Not Connected | A31          | Not Connected |
| 12         | Not Connected | GND          | Not Connected |
| 13         | Not Connected | +5 V         | Not Connected |
| 14         | Not Connected | D16          | Not Connected |
| 15         | Not Connected | D17          | Not Connected |
| 16         | Not Connected | D18          | Not Connected |
| 17         | Not Connected | D19          | Not Connected |
| 18         | Not Connected | D20          | Not Connected |
| 19         | Not Connected | D21          | Not Connected |
| 20         | Not Connected | D22          | Not Connected |
| 21         | Not Connected | D23          | Not Connected |
| 22         | Not Connected | GND          | Not Connected |
| 23         | Not Connected | D24          | Not Connected |
| 24         | Not Connected | D25          | Not Connected |
| 25         | Not Connected | D26          | Not Connected |
| 26         | Not Connected | D27          | Not Connected |
| 27         | Not Connected | D28          | Not Connected |
| 28         | Not Connected | D29          | Not Connected |
| 29         | Not Connected | D30          | Not Connected |
| 30         | Not Connected | D31          | Not Connected |
| 31         | Not Connected | GND          | Not Connected |
| 32         | Not Connected | +5 V         | Not Connected |

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# Common Questions

This appendix answers common questions you may have when using the VXI/VMEpc 600 Series.

## **What do the LEDs on the front of the VXI/VMEpc 600 Series mean?**

Refer to Appendix B, [LED Indicators](#), for a description of the front panel LEDs.

## **Is something wrong with the VXI/VMEpc 600 Series if the red SYSF and FAIL LEDs stay lit after booting the VXI/VMEpc 600 Series?**

If either the **SYSF** or **FAIL** LED remains lit, refer to Appendix B, [LED Indicators](#), for troubleshooting steps.

## **Can I access 32-bit registers in my VXI/VMEbus system from the VXI/VMEpc 600 Series?**

Yes. The VXI/VMEpc 600 Series uses the 32-bit PCI bus to interface to the VXI/VMEbus. In fact, its VXI/VMEbus circuitry also supports the new VME64 standard for D64 accesses.

## **What kind of signal is CLK10 and what kind of signal do I need for an external CLK10?**

- ◆ **VXI Only**—CLK10 is a differential ECL signal on the backplane. However, the oscillator and the EXTCLK input on the front panel use TTL levels; therefore, you need to supply a TTL-level signal for EXTCLK. Our voltage converters convert the signal to differential ECL.

## **What is the accuracy of the CLK10 signal?**

- ◆ **VXI Only**—The CLK10 signal generated by the VXIpc 600 Series is  $\pm 100$  ppm (0.01%) as per the VXIbus specification. If you need a more accurate CLK10 signal, you can use the external CLK connector on the front panel.

### **What if my keyboard connector does not fit into the keyboard port on the VXI/VMEpc 600 Series?**

You can plug keyboards that have a 6-pin Mini DIN PS/2 type connector directly into the VXI/VMEpc 600 Series. You can use the keyboard adapter cable that is included with every VXI/VMEpc 600 Series kit to adapt the larger AT keyboard connector to the 6-pin Mini DIN connector.

### **What must I do if I want to install the VXI/VMEpc-650 in a slot other than the System Controller slot?**

The VXI/VMEpc 600 Series automatically detects whether it is in the System Controller slot (first slot) of a VXI/VMEbus mainframe. You do not need to change jumper settings to install the VXI/VMEpc controller in a different slot unless you have defeated the first slot detector (FSD) circuitry by changing the appropriate jumper setting on the VXI/VMEpc.

Remember that devices in all other slots must not be manually configured as system controller; they should be configured either for automatic detection or manual non-System Controller.

Refer to Chapter 3, *Configuration and Installation*, for information on enabling and defeating the FSD circuitry.

### **How do I check the configuration of the memory, floppy drive, hard drive, time/date, and so on?**

You can view these parameters in the BIOS setup. To enter the BIOS setup, reboot the VXI/VMEpc 600 Series and press the <DEL> key during the memory tests. Refer to Chapter 4, *BIOS*, for more information.

### **How can I boot from an external SCSI hard drive?**

1. Enter the BIOS setup by pressing the <DEL> key during the memory test.
2. Select **Standard CMOS Setup**.
3. Press the down arrow key until the **Pri Master** field is highlighted, and set it to **Not Installed**.
4. Press <ESC> and move the cursor to **Save Settings and Exit**. Press <Enter> twice.



#### **Note**

*You will not be able to access the internal IDE hard drive in this configuration.*

**Can I use the internal IDE drive and an external SCSI hard drive at the same time?**

Yes, but you can only boot from the internal IDE drive in this configuration.

**My CMOS is corrupted. How do I set it back to default?**

1. Enter the BIOS setup program as described in Chapter 4, [BIOS](#).
2. Select **Auto Configuration with Optimal Settings**.
3. Answer **Y** (yes) to the verification prompt.
4. Select **Save Settings and Exit**.

**Why does the SCSI BIOS load twice during bootup?**

The VXI/VMEpc 600 Series is a dual controller. The PCI BIOS detects both functions of the VXI/VMEpc 600 Series and tries to load a ROM extension for each function. This usually occurs only when there are no SCSI devices attached to the VXI/VMEpc 600 Series.

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# Customer Communication

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve your technical problems and a form you can use to comment on the product documentation. When you contact us, we need the information on the Technical Support Form and the configuration form, if your manual contains one, about your system configuration to answer your questions as quickly as possible.

National Instruments has technical assistance through electronic, fax, and telephone systems to quickly provide the information you need. Our electronic services include a bulletin board service, an FTP site, a fax-on-demand system, and e-mail support. If you have a hardware or software problem, first try the electronic support systems. If the information available on these systems does not answer your questions, we offer fax and telephone support through our technical support centers, which are staffed by applications engineers.

## Electronic Services

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United States: 512 794 5422

Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422

Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 01 48 65 15 59

Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

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To access our FTP site, log on to our Internet host, `ftp.natinst.com`, as anonymous and use your Internet address, such as `joesmith@anywhere.com`, as your password. The support files and documents are located in the `/support` directories.

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[support@natinst.com](mailto:support@natinst.com)

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National Instruments has branch offices all over the world. Use the list below to find the technical support number for your country. If there is no National Instruments office in your country, contact the source from which you purchased your software to obtain support.

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| Belgium          | 02 757 00 20    | 02 757 03 11     |
| Brazil           | 011 288 3336    | 011 288 8528     |
| Canada (Ontario) | 905 785 0085    | 905 785 0086     |
| Canada (Quebec)  | 514 694 8521    | 514 694 4399     |
| Denmark          | 45 76 26 00     | 45 76 26 02      |
| Finland          | 09 725 725 11   | 09 725 725 55    |
| France           | 01 48 14 24 24  | 01 48 14 24 14   |
| Germany          | 089 741 31 30   | 089 714 60 35    |
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| Spain            | 91 640 0085     | 91 640 0533      |
| Sweden           | 08 730 49 70    | 08 730 43 70     |
| Switzerland      | 056 200 51 51   | 056 200 51 55    |
| Taiwan           | 02 377 1200     | 02 737 4644      |
| United Kingdom   | 01635 523545    | 01635 523154     |
| United States    | 512 795 8248    | 512 794 5678     |

# Technical Support Form

Photocopy this form and update it each time you make changes to your software or hardware, and use the completed copy of this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

If you are using any National Instruments hardware or software products related to this problem, include the configuration forms from their user manuals. Include additional pages if necessary.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

Fax ( \_\_\_\_ ) \_\_\_\_\_ Phone ( \_\_\_\_ ) \_\_\_\_\_

Computer brand \_\_\_\_\_ Model \_\_\_\_\_ Processor \_\_\_\_\_

Operating system (include version number) \_\_\_\_\_

Clock speed \_\_\_\_\_ MHz RAM \_\_\_\_\_ MB Display adapter \_\_\_\_\_

Mouse \_\_\_\_ yes \_\_\_\_ no Other adapters installed \_\_\_\_\_

Hard disk capacity \_\_\_\_\_ MB Brand \_\_\_\_\_

Instruments used \_\_\_\_\_

\_\_\_\_\_

National Instruments hardware product model \_\_\_\_\_ Revision \_\_\_\_\_

Configuration \_\_\_\_\_

National Instruments software product \_\_\_\_\_ Version \_\_\_\_\_

Configuration \_\_\_\_\_

The problem is: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

List any error messages: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The following steps reproduce the problem: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# VXI/VMEpc 600 Series Hardware and Software Configuration Form

Record the settings and revisions of your hardware and software on the line to the right of each item. Complete a new copy of this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

## National Instruments Products

NI-VXI/VISA Software Version Number \_\_\_\_\_

NI-488.2M Software Version Number \_\_\_\_\_

Using Both NI-VXI and NI-VISA? \_\_\_\_\_

Using LabVIEW or LabWindows/CVI? \_\_\_\_\_

## VXI/VMEpc 600 Series Hardware Settings

VXIpc 600 or VMEpc 600 Series Model Number \_\_\_\_\_

Part Number \_\_\_\_\_

Serial Number \_\_\_\_\_

Hard Drive Size \_\_\_\_\_ Video Memory \_\_\_\_\_

Processor Speed \_\_\_\_\_

Slot Location \_\_\_\_\_

W1 Setting: MITE Self-Configuration \_\_\_\_\_

W2 Setting: External Trigger SMB Termination \_\_\_\_\_

W3 Setting: SCSI Termination \_\_\_\_\_

W4 Setting: CLK10 SMB Direction \_\_\_\_\_

W5 Setting: CLK10 SMB Termination \_\_\_\_\_

W6 Setting: CLK10 Source \_\_\_\_\_

W7 Setting: CLK10 SMB Polarity \_\_\_\_\_

W9 Setting: MITE Configuration EEPROM \_\_\_\_\_

W11 Setting: System Controller Slot Detection \_\_\_\_\_

W20 Setting: CMOS Clear \_\_\_\_\_



## Other Products

Computer make and model \_\_\_\_\_

Microprocessor \_\_\_\_\_

Clock frequency or speed \_\_\_\_\_

Type of video board installed \_\_\_\_\_

Operating system version \_\_\_\_\_

Operating system mode \_\_\_\_\_

Programming language \_\_\_\_\_

Programming language version \_\_\_\_\_

Other boards in system \_\_\_\_\_

Base I/O address of other boards \_\_\_\_\_

DMA channels of other boards \_\_\_\_\_

Interrupt level of other boards \_\_\_\_\_

# Documentation Comment Form

National Instruments encourages you to comment on the documentation supplied with our products. This information helps us provide quality products to meet your needs.

**Title:** *VXI/VMEpc™ 600 Series User Manual*

**Edition Date:** May 1998

**Part Number:** 321881A-01

Please comment on the completeness, clarity, and organization of the manual.

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If you find errors in the manual, please record the page numbers and describe the errors.

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Thank you for your help.

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National Instruments Corporation  
512 794 5678

| Prefix  | Meanings | Value      |
|---------|----------|------------|
| p-      | pico     | $10^{-12}$ |
| n-      | nano-    | $10^{-9}$  |
| $\mu$ - | micro-   | $10^{-6}$  |
| m-      | milli-   | $10^{-3}$  |
| k-      | kilo-    | $10^3$     |
| M-      | mega-    | $10^6$     |
| G-      | giga-    | $10^9$     |
| t-      | tera-    | $10^{12}$  |

## Symbols

○ degrees

 $\Omega$  ohms

# A

A                      amperes

|           |   |
|-----------|---|
| A24 space | VXibus address space equivalent to the VME 16 MB standard address space |
|-----------|---|

|           |  |
|-----------|--|
| A32 space | VXibus address space equivalent to the VME 4 GB extended address space |
|-----------|--|

address                      character code that identifies a specific location (or series of locations) in memory

|               |  |
|---------------|--|
| address space | a set of $2^n$ memory locations differentiated from other such sets in VXI/VMEbus systems by six addressing lines known as address modifiers. $n$ is the number of address lines required to uniquely specify a byte location in a given space. Valid numbers for $n$ are 16, 24, and 32. In VME/VXI, because there are six address modifiers, there are 64 possible address spaces. |
| ANSI          | American National Standards Institute  |
| API           | Application Programming Interface; the direct interface that an end user sees when creating an application   |
| ASD           | Acceleration Spectral Density; a calculation of random vibration intensity across a frequency bandwidth  |
| ASIC          | application-specific integrated circuit—a proprietary semiconductor component designed and manufactured to perform a set of specific functions for a specific customer   |
| <b>B</b>      |  |
| b             | bit—one binary digit, either 0 or 1  |
| B             | byte—eight related bits of data, an 8-bit binary number. Also used to denote the amount of memory required to store one byte of data.  |
| backplane     | an assembly, typically a printed circuit board, with 96-pin connectors and signal paths that bus the connector pins. A C-size VXIbus system will have two sets of bused connectors called J1 and J2. A D-size VXIbus system will have three sets of bused connectors called J1, J2, and J3.  |
| BERR*         | bus error signal   |
| BIOS          | Basic Input/Output System. BIOS functions are the fundamental level of any PC or compatible computer. BIOS functions embody the basic operations needed for successful use of the computer's hardware resources.   |
| bus           | the group of conductors that interconnect individual circuitry in a computer. Typically, a bus is the expansion vehicle to which I/O or other devices are connected. Examples of buses include the ISA bus, PCI bus, VXI bus, and VME bus.   |

**bus error** an error that signals failed access to an address. Bus errors occur with low-level accesses to memory and usually involve hardware with bus mapping capabilities. For example, nonexistent memory, a nonexistent register, or an incorrect device access can cause a bus error.

## C

**C** Celsius

**CLK10** a 10 MHz,  $\pm 100$  ppm, individually buffered (to each module slot), differential ECL system clock that is sourced from Slot 0 of a VXIbus mainframe and distributed to Slots 1 through 12 on P2. It is distributed to each slot as a single-source, single-destination signal with a matched delay of under 8 ns.

**CMOS** Complementary Metal Oxide Semiconductor; a process used in making chips

## D

**DIN** Deutsches Institut für Normung—German Standards Institute

**DMA** Direct Memory Access; a method by which data is transferred between devices and internal memory without intervention of the central processing unit. DMA is the fastest method of transferring data to/from computer memory.

**DRAM** Dynamic RAM (Random Access Memory); storage that the computer must refresh at frequent intervals

## E

**ECL** Emitter-Coupled Logic

**EEPROM** Electronically Erasable Programmable Read Only Memory—ROM that can be erased with an electrical signal and reprogrammed

**embedded controller** an intelligent CPU (controller) interface plugged directly into the VXI backplane, giving it direct access to the VXIbus. It must have all of its required VXI interface capabilities built in.

|                  |  |
|------------------|--|
| EMC              | electromagnetic compliance                                     |
| EMI              | electromagnetic interference                                   |
| external trigger | a voltage pulse from an external source that triggers an event |

## **F**

|                |  |
|----------------|--|
| fair requester | a VXIbus device that will not arbitrate for the VXIbus after releasing it until it detects the bus request signal inactive. This ensures that all requesting devices will be granted use of the bus. |
|----------------|--|

## **G**

|                  |  |
|------------------|--|
| g                | <ol style="list-style-type: none"><li>1. grams</li><li>2. A measure of acceleration equal to 9.8 m/s<sup>2</sup></li></ol> |
| GPIB             | General Purpose Interface Bus (IEEE 488)   |
| $g_{\text{RMS}}$ | A measure of random vibration. The root mean square of acceleration levels in a random vibration test profile.             |

## **H**

|     |  |
|-----|--|
| hex | hexadecimal; the numbering system with base 16, using the digits 0 to 9 and letters A to F |
| Hz  | hertz; cycles per second   |

## **I**

|      |   |
|------|---|
| IDE  | Integrated Drive Electronics. Denotes the most common interface to the hard drive on PCs.   |
| IEC  | International Electrotechnical Commission. The IEC publishes internationally recognized standards. IEC 60068 contains information on environmental testing procedures and severities. |
| IEEE | Institute of Electrical and Electronics Engineers   |
| in.  | inches  |

|                   |  |
|-------------------|--|
| I/O               | input/output; the techniques, media, and devices used to achieve communication between machines and users  |
| instrument driver | a set of routines designed to control a specific instrument or family of instruments, and any necessary related files for LabWindows/CVI or LabVIEW  |
| interrupt         | a means for a device to request service from another device; a computer signal indicating that the CPU should suspend its current task to service a designated activity  |
| interrupt handler | a VMEbus functional module that detects interrupt requests generated by interrupters and responds to those requests by requesting status and identify information  |
| interrupt level   | the relative priority at which a device can interrupt  |
| IRQ*              | interrupt signal   |
| ISA               | Industry Standard Architecture; denotes a common expansion bus used in PCs   |
| <b>K</b>          |  |
| K                 | kilo—(1) the standard metric prefix for 1,000, or $10^3$ , used with units of measure such as volts, hertz, and meters; (2) the prefix for 1,024, or $2^{10}$ , used with B (byte) in quantifying data or computer memory      |
| <b>L</b>          |  |
| LED               | light-emitting diode   |
| <b>M</b>          |  |
| m                 | meters   |
| M                 | mega—(1) the standard metric prefix for 1 million or $10^6$ , when used with units of measure such as volts and hertz; (2) the prefix for 1,048,576, or $2^{20}$ , when used with B (byte) to quantify data or computer memory |
| MANTIS            | a National Instruments custom ASIC that performs VXIbus arbitration and manages interrupts and triggers  |

|        |  |
|--------|--|
| master | a functional part of a VME/VXibus device that initiates data transfers on the backplane. A transfer can be either a read or a write.   |
| MBLT   | eight-byte block transfers in which both the Address bus and the Data bus are used to transfer data  |
| MITE   | a National Instruments custom ASIC, a sophisticated dual-channel DMA controller that incorporates the Synchronous MXI and VME64 protocols to achieve high-performance block transfer rates |
| MODID  | module ID lines. Used in VXI to geographically locate boards and to dynamically configure boards   |
| MTBF   | Mean Time Between Failure  |

## **N**

|                       |  |
|-----------------------|--|
| NI-488.2 or NI-488.2M | the National Instruments industry-standard software for controlling GPIB instruments   |
| NI-VISA               | the National Instruments implementation of the VISA standard; an interface-independent software that provides a unified programming interface for VXI, GPIB, and serial instruments  |
| NI-VXI                | the National Instruments bus interface software for VME/VXibus systems   |
| Non-Slot 0 device     | a device configured for installation in any slot in a VXibus mainframe other than Slot 0. Installing such a device into Slot 0 can damage the device, the VXibus backplane, or both. |

## **P**

|        |  |
|--------|--|
| PCI    | Peripheral Component Interconnect. The PCI bus is a high-performance 32-bit or 64-bit bus with multiplexed address and data lines. |
| PCMCIA | Personal Computer Memory Card International Association  |
| POSC   | Power-On Self Configuration. A process by which the MITE chip programs its own registers from EEPROMs at power up                  |



## R

**Resource Manager** a message-based Commander located at Logical Address 0, which provides configuration management services such as address map configuration, Commander and Servant mappings, and self-test and diagnostic management

**RMS** Root mean squared. See *gRMS*.

## S

**s** seconds

**SCSI** Small Computer System Interface (bus)

**slave** a functional part of a VME/VXibus device that detects data transfer cycles initiated by a VMEbus master and responds to the transfers when the address specifies one of the device's registers

**SMB** Sub Miniature Type B connector that features a snap coupling for fast connection

**SYSFAIL** A VMEbus signal that is used by a device to indicate an internal failure. A failed device asserts this line. In VXI, a device that fails also clears its PASSED bit in its Status register.

**System Controller** a device configured for installation in Slot 0 of a VXibus mainframe or Slot 1 of a VMEbus chassis. This device is unique in the VXI/VMEbus system in that it performs the VXI/VMEbus System Controller functions, including clock sourcing and arbitration for data transfers across the backplane. Installing such a device into any other slot can damage the device, the VXI/VMEbus backplane, or both.

## T

**trigger** either TTL or ECL lines used for intermodule communication

**TTL** Transistor-Transistor Logic

## U

|             |  |
|-------------|--|
| USB         | Universal Serial Bus   |
| user window | a region of PCI address space reserved by the hardware for use via the NI-VXI low-level function calls |
| UW SCSI     | Ultra Wide SCSI  |

## V

|                          |   |
|--------------------------|---|
| V                        | volts   |
| VGA                      | Video Graphics Array; the minimum video display standard for all PCs  |
| VISA                     | Virtual Instrument Software Architecture. This is the general name given to VISA and its associated architecture.   |
| VME                      | Versa Module Eurocard or IEEE 1014  |
| VMEbus System Controller | a device configured for installation in Slot 1 of a VMEbus chassis. This device is unique in the VMEbus system in that it performs the VMEbus System Controller functions, including clock sourcing and arbitration for data transfers across the backplane. Installing such a device into any other slot can damage the device, the VMEbus backplane, or both. |
| VXIbus                   | VMEbus Extensions for Instrumentation   |

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