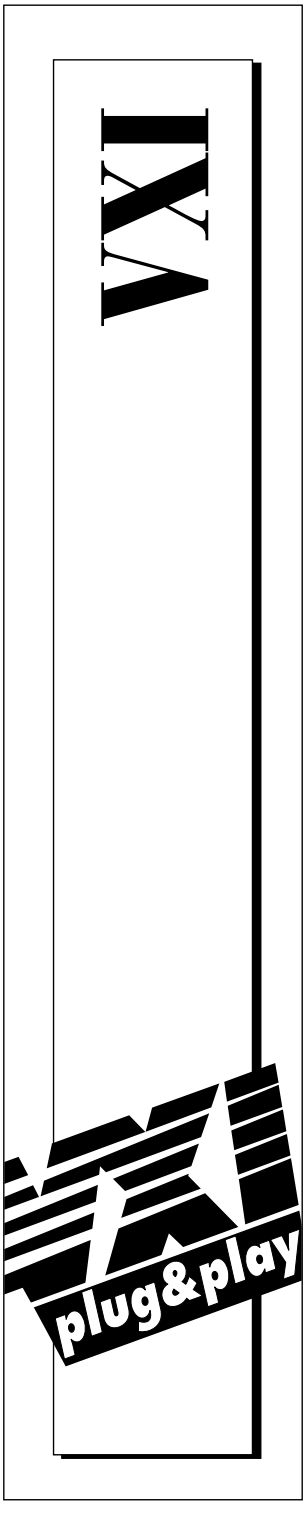


Getting Started with Your VXIpc™-850

April 1996 Edition
Part Number 321123B-01

Internet Support

GPIB: gpib.support@natinst.com
DAQ: daq.support@natinst.com
VXI: vxi.support@natinst.com
LabVIEW: lv.support@natinst.com
LabWindows: lw.support@natinst.com
HiQ: hiq.support@natinst.com
VISA: visa.support@natinst.com

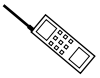
E-mail: info@natinst.com
FTP Site: ftp.natinst.com
Web Address: http://www.natinst.com

Bulletin Board Support

BBS United States: (512) 794-5422 or (800) 327-3077
BBS United Kingdom: 01635 551422
BBS France: 1 48 65 15 59

FaxBack Support

(512) 418-1111



Telephone Support (U.S.)

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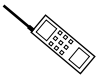
Fax: (512) 794-5678



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6504 Bridge Point Parkway Austin, TX 78730-5039 Tel: (512) 794-0100

Important Information

Warranty

The National Instruments VXIpc-850 Series embedded computers and accessories are warranted against defects in materials and workmanship for a period of one year from the date of shipment, as evidenced by receipts or other documentation. National Instruments will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

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FCC/DOC Radio Frequency Interference Class A Compliance

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.***

This device complies with the FCC rules only if used with shielded interface cables of suitable quality and construction. National Instruments used such cables to test this device and provides them for sale to the user. The use of inferior or nonshielded interface cables could void the user's authority to operate the equipment under the FCC rules.

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.

Canadian Department of Communications

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

You can use this manual to help you get a quick start with the VXIpc-850 Series embedded computer and the NI-VXI software. This manual summarizes the setup instructions and default settings for the hardware and software. You may find that these sections contain as much information as you need to get started with your VXIpc-850 kit.

Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, describes the VXIpc-850 Series of embedded VXI computers along with the NI-VXI software, lists what you need to get started, and lists optional software.
- Chapter 2, *Setup*, contains basic instructions for setting up the VXIpc-850 and the NI-VXI software.
- Chapter 3, *Default Settings*, summarizes the hardware and software default settings for the VXIpc-850 kit. If you need more information about a particular setting or if you want to try a different configuration, refer to the user manuals in your kit.
- Appendix A, *Specifications*, describes the environmental, electrical, and mechanical specifications of the VXIpc-850.
- Appendix B, *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 in this manual, including the page where you can find each one.

Conventions Used in This Manual

The following conventions are used in this manual:

bold	Bold text denotes menus, menu items, or dialog box buttons or options.
bold monospace	Bold text in this font denotes the messages and responses that the computer automatically prints to the screen.
italic	Italic text denotes emphasis, a cross reference, or an introduction to a key concept.
monospace	Text in this font denotes text or characters that are to be literally input from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of programs, subprograms, functions, filenames, and extensions.
♦	The ♦ symbol indicates that the text following it applies only to a specific operating system.
	Abbreviations, acronyms, metric prefixes, mnemonics, symbols, and terms are listed in the *Glossary*.

How to Use This Documentation Set

Begin by reading this manual, *Getting Started with Your VXIpc-850*, for basic instructions on setting up the hardware and software. This is a brief quick start manual that describes how to get started with your kit using the default hardware and software settings. Refer to the following manuals for more information about the hardware or software.

The *VXIpc-850 Series User Manual* contains more details about changing the installation or configuration from the defaults, and using the hardware.

The *VXIpc-850 Peripherals User Manual* contains in-depth information about configuring and using various peripherals on the VXIpc-850.

The *NI-VXI Software Manual for the VXIpc-850 Series* contains more details about changing the NI-VXI software installation or configuration from the defaults, and using the NI-VXI software on the VXIpc-850.

When you are familiar with the material in this getting started manual, you can begin to use the *NI-VXI Software Reference Manual for C*. Chapter 1, *Introduction to VXI*, and Chapter 2, *Introduction to the NI-VXI Functions*, present the concepts of VXI and prepare you for detailed explanations of the NI-VXI functions. Study the descriptions of each function given in Chapters 3 through 13 to fully understand the purpose and syntax of each function.

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.

Related Documentation

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

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 B, *Customer Communication*, at the end of this manual.

Chapter 1

Introduction

This chapter describes the VXIpc-850 Series of embedded VXI computers along with the NI-VXI software, lists what you need to get started, and lists optional software.

What You Need to Get Started

- ❑ VXIpc-850 embedded controller
- ❑ VXIbus mainframe
- ❑ Keyboard (and included adapter cable)
- ❑ PS/2 mouse
- ❑ Monitor with VGA or better resolution

The following items are already installed on your VXIpc-850 computer. They are also included on disk in the event that you need to reinstall your software.

- ❑ LabWindows®/CVI Run-Time Engine (for Windows 95/NT/3.1 users)
- ❑ NI-VXI software media for the VXIpc-850 Series

Hardware Description

The VXIpc-850, a Pentium-based, C-size embedded computer based on the Peripheral Component Interface (PCI) bus, is a high-performance, easy-to-use platform for controlling VXIbus systems, featuring complete VXI functionality through interactive utilities and C function calls. In addition, the VXIpc-850 has an IEEE 488 interface that is compatible with the NI-488.2 architecture.

The VXIpc-850 is a custom computer that you install directly in two C-size slots of your VXIbus mainframe. It can take advantage of the VXI high-performance backplane capabilities and give you direct control of VXI registers, memory, interrupts, and triggers.

All models in the VXIpc-850 Series are fully VXI*plug&play* compliant and can be used 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.

For in-depth details on the VXIpc-850 hardware, consult the *VXIpc-850 Series User Manual*. The *VXIpc-850 Peripherals User Manual* describes how to configure and use various peripherals with your VXIpc-850.

Software Description

The NI-VXI bus interface software for the VXIpc-850 Series includes a VXI/MXI Resource Manager, graphical and text-based versions of an interactive VXI resource editor program, a comprehensive library of software routines for VXI programming, and a VXI interactive control program. You can use this software to create applications that seamlessly control multiple-mainframe configurations. These applications have software compatibility across a variety of VXI controller platforms.

For more information on installing and configuring the NI-VXI software, refer to the *NI-VXI Software Manual for the VXIpc-850 Series*. This manual describes each field in the **VXIpc Configuration Editor** of the VXIedit software utility. You can use the *NI-VXI Graphical Utilities Reference Manual* and the *NI-VXI Text Utilities Reference Manual* to get more information about the VIC or VICtext utilities and the other configuration editors in VXIedit. Refer to the *NI-VXI Software Reference Manual for C* for details about NI-VXI function calls.

Software Configurations

There are four software configurations described in this manual:

- NI-VXI for DOS/Windows 3.1—you can use this version of the software to develop and run 16-bit DOS/Windows 3.1 applications. You can also use this software under Windows 95 if you intend to use 16-bit applications only.

- NI-VXI Upgrade for Windows 95—this is a compatibility release that extends your NI-VXI for DOS/Windows 3.1 to allow 32-bit applications running in Windows 95 to use the 16-bit driver. In this configuration you can run both 16-bit and 32-bit applications; however, the core of the driver is 16-bit.
- NI-VXI for Windows 95—this is a fully 32-bit native Plug and Play driver for Windows 95. You can run *only* 32-bit applications with this driver. You cannot use this driver in conjunction with either NI-VXI for DOS/Windows 3.1 or the NI-VXI Upgrade for Windows 95 to run 16-bit applications. Applications developed using this driver will run with NI-VXI for Windows NT without the need to recompile.
- NI-VXI for Windows NT—this is a 32-bit driver designed for Windows NT. You can use this version to develop and run 32-bit applications for Windows 95/NT.

Optional Software

Your VXIpc-850 kit includes the NI-VXI bus interface software. In addition, you can use the National Instruments LabVIEW and LabWindows/CVI application programs and instrument drivers to ease your programming tasks. These standardized programs match the modular virtual instrument capability of VXI and can reduce your VXI/VMEbus software development time. These programs are fully VXI*plug&play* compliant and feature extensive libraries of VXI instrument drivers written to take full advantage of the VXI bus.

LabVIEW and LabWindows/CVI include all the tools needed for instrument control, data acquisition, analysis, and presentation. When you order the LabVIEW VXI Development System for Windows or the LabWindows/CVI VXI Development System for Windows, you also get more than 500 complete instrument drivers, which are modular, source-code programs that handle the communication with your instrument to speed your application development.

Chapter 2

Setup

This chapter contains basic instructions for setting up the VXIpc-850 and the NI-VXI software.

You can use this material as a guide to quickly configure and operate your VXI system using the VXIpc-850. This chapter assumes that you intend to perform a basic configuration as follows:

- You have one VXIbus chassis in which you will be using the VXIpc-850 as the Resource Manager (logical address 0).
- You will be using the NI-VXI software for initialization, configuration, and device interaction.
- You will use the default hardware and software settings.

Refer to Chapter 3 of this manual for a complete listing of the hardware and software default settings. If you need more information, or if you want to try a different configuration, please refer to the *VXIpc-850 Series User Manual* for information about the hardware, or to the *NI-VXI Software Manual for the VXIpc-850 Series* for information about the NI-VXI software.

Hardware Installation

To prevent electrostatic discharge, touch the antistatic plastic package to a metal part of your VXIbus chassis before removing the VXIpc-850 from the package. Install the VXIpc-850 in the first slot of a VXI chassis (slot 0). The VXIpc-850 default configuration automatically detects whether it should be the VXIbus system controller. The VXIbus system controllers operate certain VXIbus lines as required for VXI systems. Verify that any other VXI devices with system controller capability that are located in the same chassis are not configured as system controller. Having more than one device configured as system controller will damage the VXI system.

For VXI systems that include VME devices, ensure that the VME devices are not configured in the upper 16 KB (starting from 0xC000) of the A16 address space. This region is reserved for VXI device configuration registers which are used for initializing, configuring, and interacting with VXI devices.

Also ensure that no VXI devices in your system are configured for logical address 0. This is the default configuration for the VXIpc-850.

Setting up the VXIpc-850

The VXIpc-850 kit works with Windows 95/NT/3.1 or DOS, but the operating systems have different installation and configuration requirements. Be sure to observe any specific instructions for Windows 95/NT/3.1 or DOS in the following information. For more details about installing the NI-VXI software, refer to Chapter 2, *NI-VXI Software Installation*, in the *NI-VXI Software Manual for the VXIpc-850 Series.*

Windows Users

At Windows 3.*x* or Windows 95 startup, you are prompted to insert a disk to configure the system for LabVIEW or LabWindows/CVI. If you ordered either of these programming environments, select the appropriate checkbox and insert the configuration disk. Follow the instructions as prompted.

Do not select either checkbox if you did not order LabVIEW or LabWindows/CVI. Instead you should click on the **Next** button to continue with the installation.

You will need to initialize your VXIbus system by performing the following steps.

1. Locate the NI-VXI group in the Program Manager and run the **VXIinit** item. This utility initializes the VXIpc-850 hardware.

- **Windows 95 users—**Because Windows 95 supports the plug and play architecture, you do not need to run VXIinit to initialize the VXIpc-850. Proceed to step 2.

2. Execute the **Resman** item, which is located within the same NI-VXI group.

DOS Users

Although the VXIpc-850 default configuration can get Windows users up and running without any changes, DOS users must reconfigure the VXIpc-850 to operate with applications that will use the NI-VXI software for DOS. You must use the VXI Resource Editor program, either VXIedit or VXItedit, to make these necessary changes.

1. Run the VXIedit or VXItedit utility.
2. Select the **VXIpc Configuration Editor** from the options list.
3. Relocate the VXIpc-850 driver window to below 1 MB. Notice that the VXIedit or VXItedit utility warns you that the driver window is located above 1 MB. While this default setting is acceptable for Windows users, DOS users must enter a memory address below the 1 MB boundary to relocate the VXIpc-850 registers temporarily. Select an unused section of the Upper Memory region (usually 0xC800 to 0xE800). Notice that this memory cannot be used by another device (such as a plug-in card) or memory manager (such as `EMM386.EXE`). This placement is valid only while VXIedit or VXItedit is running.
4. To permanently place the board at the address, use the **Bus Configuration Editor** in VXIedit or VXItedit. Within this editor, set the **Below 1 MB** control for the driver window to **Yes**. In the **Window Base** field, select the address space to which to assign the VXIpc-850 registers.
5. Update your configuration in VXIedit or VXItedit by selecting the **Update Current Configuration** option from the VXIpc-850 Configuration Editor main menu.
6. Reboot your computer.
7. Execute VXIinit from the DOS prompt. This utility initializes the VXIpc-850 hardware. VXIinit also shows where the PCI Configuration Manager has placed your VXIpc-850. If this region conflicts with another board in your system, or if you experience any problems with your system, refer to the *User Window and Driver Window* section in Chapter 3, *NI-VXI Configuration Utility*, in the *NI-VXI Software Manual for the VXIpc-850 Series*. Notice that if you are using a memory manager (such as `EMM386.EXE`), you must exclude the region assigned to your VXIpc-850. This region may shift if you insert any expansion boards into the PCI expansion slot.
8. Execute `RESMAN` to configure your VXI system.

VME Users

RESMAN identifies and configures the VXI devices. RESMAN does not configure VME devices. The VME specification does not define the initialization and configuration procedures that the VXI specification requires.

However, it is recommended that you enter the information about your VME devices into the VXIedit or VXItedit utility. RESMAN can then use this information to properly configure the various device-specific VME address spaces and VME interrupt lines. For more information on configuring non-VXI devices in your VXI system, refer to the description of the **Non-VXI Device Configuration Editor** in Chapter 3, *VXI Resource Editor: VXIedit*, of the *NI-VXI Graphical Utilities Reference Manual*.

Device Interaction

After RESMAN has detected and configured all VXI/VME devices, you can view specific information on each device in your system by using the VXIedit or VXItedit utilities. These utilities include a **Resource Manager Display**, which contains a description for each device, including each VXI device's logical address.

You can interact with your VXI/VME devices by using the VIC or VICtext utilities. With these utilities, you can interactively control your VXI/VME devices without having to use a conventional programming language, LabVIEW, or LabWindows/CVI.

Try the following in VIC or VICtext:

At the prompt:

```
ROOT>>
```

Type:

```
ROOT>>help vxiinreg
```

This help file shows you the syntax for this command, which reads VXI device configuration registers. The first argument is a logical address, and the second is the offset of the VXI device configuration register to be read.

Type:

```
ROOT>>vxiinreg 0,0
```

This should return a value, such as:

```
Return Status (0): SUCCESS.
value = 0x9ff6
```

If the value ends with `ff6`, you have successfully read the National Instruments manufacturer ID from the ID register for the VXIpc-850.

You may now want to read the configuration registers from other VXI devices in your system using the command `vxiinreg`. This command accesses only the upper 16 KB of A16 space. Try reading the registers from one of the devices listed in the **Resource Manager Display** of either VXIedit or VXItedit. In this way, you can verify that your VXIpc-850 can access each of the devices in your VXI system successfully. You can also access VXI and VME devices that are configured in A16, A24, and A32 address space by using the `vxiin` or `vxiout` commands.

For more information regarding VIC operation and commands, refer to the *NI-VXI Graphical Utilities Reference Manual*. For more information regarding VICtext operation and commands, refer to the *NI-VXI Text Utilities Reference Manual.*

Chapter 3

Default Settings

This chapter summarizes the hardware and software default settings for the VXIpc-850 kit. If you need more information about a particular setting or if you want to try a different configuration, refer to the user manuals in your kit.

Refer to the *VXIpc-850 Series User Manual* for more detailed information about the hardware default settings and options. The *NI-VXI Software Manual for the VXIpc-850 Series* contains more details about the NI-VXI software default settings and options.

Table 3-1. VXIpc-850 Hardware Default Settings

Hardware Component	Default Setting
S1—Ethernet EEPROM	Enabled. *Do not alter this setting*.
S2—POSC	Enabled. *Do not alter this setting*.
S3—CLK10 Source	Source from onboard oscillator
S4—CLK10 SMB Polarity	Not inverted
S5—CLK10 SMB Direction	Receive CLK10
S6—CLK10 SMB Termination	Do not terminate
S7—TrigIn SMB Termination	Do not terminate
S8—GPIB Circuitry Interrupt	Level 11

(continues)

Table 3-1. VXIpc-850 Hardware Default Settings (Continued)

Hardware Component	Default Setting
S9—MITE Configuration EEPROM	Load values from user section
W1—SCSI Termination	Enabled
W2—CMOS Clear	CMOS not cleared
W4—Parallel Port DMA Channel	Channel 1
W13—Slot Detection	Automatically detect slot

Table 3-2. Logical Address Configuration Editor Default Settings

Editor Field	Default Setting
Logical Address	0
Device Type	MBD
Address Space	A16
VXI Shared RAM Size	0 KB
Shared RAM Pool (Windows)	0 KB
Lower Half Window Byte Order	Non-swapped
Upper Half Window Byte Order	Non-swapped
Upper/Lower Half Map to	Different addresses
Resource Manager Delay	5 s

Table 3-3. Device Configuration Editor Default Settings

Editor Field	Default Setting
Number of Handlers	1
Number of Interrupters	0
Servant Area Size	0
Protocol Register	0x0FF0
Read Protocol Response	0x8448
System IRQ Level	1

Table 3-4. Bus Configuration Editor Default Settings

Editor Field	Default Setting
VXI Bus Timeout	250 µs
VXI Arbiter Type	Priority
VXI Arbiter Timeout	Disabled
VXI Fair Request	Enabled
VXI Request Level	3
A24/A32 Slave Write Post	Disabled
VXI Retry Protocol	Disabled
VXI Slave Auto Retry	Enabled
VXI Transfer Limit	256
User Window Base	Auto
User Window Size	64 KB
User Window Below 1 MB	No
Driver Window Base	Auto
Driver Window Size	32 KB
Driver Window Below 1 MB	No

Appendix

A

Specifications

This appendix describes the environmental, electrical, and mechanical specifications of the VXIpc-850.

Electrical

Voltage (V)	Current (A)	
	Typical	Maximum
+5	5.82 A	6.87 A
-5.2	224.5 mA	236 mA
-2	67.2 mA	95.2 mA
+12	2.26 mA	2.63 mA
-12	2.43 mA	2.43 mA

Physical

Characteristic	Specification
Size	Two-slot VXIbus C-Size Module (233.35 by 340 by 60.96 mm)
Board Dimensions	Fully Enclosed, Shielded VXI C-Size Board 233.35 by 340 mm (9.187 by 13.386 in.)
Slot Requirements	VXI C-Size Slot
Compatibility	Fully Compatible with VXI Specification
VXI Keying Class	Class 1 TTL
MTBF	22,098 hours
Weight	2.5 Kg (5.5 lb) Typical (16 MB DRAM Installed)

Environmental

Characteristic	Specification
Temperature	0° to 55° C Operating; -20° to 70° C Storage
Relative Humidity	0% to 95% Noncondensing, Operating; 0% to 95% Noncondensing, Storage
EMI	FCC Class A Verified, EC Verified
Vibration	Operational: 5 to 500 Hz, 0.31 g, 3 axes Non-operational: 5 to 500 Hz, 2.5 g, 3 axes
Functional Shock	MIL-T-28800E Class 3 (per Section 4.5.5.4.1) Half-Sine Shock Pulse (11 ms duration, 30 g peak, 3 shocks per face)

☞ **Note:** ***Random vibration profiles were developed in accordance with MIL-T-28800E and MIL-STD-810E Method 514. Test levels exceed those recommended in MIL-STD-810E for Category 1 (Basic Transportation, Figures 514.4-1 through 514.4-3). Test report available upon request.***

Requirements

Characteristic	Specification
VXIbus Configuration Space	64 B
A24 or A32 Space	16 KB Minimum (Programmable)

Performance

VME Transfer Rate			
Peak	D32		33 MB/s
Sustained	D32	Reads	13.76 MB/s
		Writes	11.37 MB/s

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
D32, D16, D08(O) (Interrupter)	VMEbus D32, D16, D08(O) interrupter
ROAK, RORA	Release on Acknowledge or Register Access interrupter
BTO(x)	VMEbus bus timer (programmable limit)
LOCK	Can lock the VMEbus for indivisible transfers

Appendix

B

Customer Communication

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve technical problems you might have as well as a form you can use to comment on the product documentation. Filling out a copy of the *Technical Support Form* before contacting National Instruments helps us help you better and faster.

National Instruments provides comprehensive technical assistance around the world. In the U.S. and Canada, applications engineers are available Monday through Friday from 8:00 a.m. to 6:00 p.m. (central time). In other countries, contact the nearest branch office. You may fax questions to us at any time.

Electronic Services

Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call (512) 795-6990. You can access these services at:

United States: (512) 794-5422 or (800) 327-3077
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: 1 48 65 15 59
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

FTP Support

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.

FaxBack Support

FaxBack is a 24-hour information retrieval system containing a library of documents on a wide range of technical information. You can access FaxBack from a touch-tone telephone at the following number:

(512) 418-1111

E-Mail Support (currently U.S. only)

You can submit technical support questions to the appropriate applications engineering team through e-mail at the Internet addresses listed below. Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.

GPIB:	gpib.support@natinst.com
DAQ:	daq.support@natinst.com
VXI:	vxi.support@natinst.com
LabVIEW:	lv.support@natinst.com
LabWindows:	lw.support@natinst.com
HiQ:	hiq.support@natinst.com
VISA:	visa.support@natinst.com

Fax and Telephone Support

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.

	Telephone	Fax
Australia	03 9 879 9422	03 9 879 9179
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Canada (Ontario)	519 622 9310	
Canada (Quebec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	90 527 2321	90 502 2930
France	1 48 14 24 24	1 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	95 800 010 0793	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
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
U.K.	01635 523545	01635 523154

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 will reproduce the problem _____

_____

_____

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

VXIpc-850 Hardware Settings

VXIpc-850 Revision Number _____

VXIpc-850 Serial Number _____

Processor Speed _____

DRAM SIMMs Installed _____

Slot Location _____

W1 Setting: SCSI Termination _____

W2 Setting: CMOS _____

W4 Setting: LPT1 DMA _____

W13 Setting: Slot 0 Detection _____

S1 Setting: Ethernet EEPROM _____

S2 Setting: MITE Self-Configuration _____

S3 Setting: CLK10 Source _____

S4 Setting: Inverted/Non-inverted CLK10 Output _____

S5 Setting: CLK10 SMB _____

S6 Setting: CLK10 Input Termination _____

S7 Setting: External Trigger Input Termination _____

S8 Setting: GPIB IRQ Level _____

S9 Setting: MITE User/Factory Configuration _____

NI-VXI Software Settings

NI-VXI Software Version Number _____

Using VXIedit or VXItedit? _____

Logical Address _____

Device Type _____

Address Space _____

VXI Shared RAM Size _____

Shared RAM Pool (Windows) _____

Byte Order for Lower Half Window _____

Byte Order for Upper Half Window _____

Mapping Scheme for Lower and Upper Half Windows of VXI Shared RAM _____

_____

Resource Manager Delay _____

Number of Handlers _____

Number of Interrupters _____

Servant Area Size _____

Protocol Register _____

Read Protocol Response _____

System IRQ Level _____

VXI Bus Timeout _____

Arbiter Type _____

Arbiter Timeout _____

Fair Request _____

Request Level _____

A24/A32 Slave Write Post _____

VXI Retry Protocol _____

VXI Slave Auto Retry _____

VXI Transfer Limit _____

User Window Base _____

User Window Size _____

User Window Below 1 MB _____

Driver Window Base _____

Driver Window Size _____

Driver Window Below 1 MB _____

Other Products

Mainframe Make and Model _____

Microprocessor _____

Clock Frequency _____

Type of Video Board Installed _____

Operating System _____

Operating System Version _____

Operating System Mode _____

Programming Language _____

Programming Language Version _____

Other Boards in System _____

Monitor (Manufacturer, Model) _____

Mouse (Manufacturer, Model) _____

Keyboard (Manufacturer, Model) _____

Other Peripherals (Manufacturer, Model) _____

_____

_____

_____

_____

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: Getting Started with Your VXIpc™-850

Edition Date: April 1996

Part Number: 321123B-01

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

_____

_____

_____

_____

_____

_____

_____

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

_____

_____

_____

_____

_____

_____

_____

Thank you for your help.

Name _____

Title _____

Company _____

Address _____

_____

Phone (_____) _____

Mail to: Technical Publications
National Instruments Corporation
6504 Bridge Point Parkway
Austin, TX 78730-5039

Fax to: Technical Publications
National Instruments Corporation
(512) 794-5678

Glossary

Prefix	Meaning	Value
n-	nano-	10^{-9}
µ-	micro-	10^{-6}
m-	milli-	10^{-3}
K-	kilo-	10^{3}
M	mega-	10^{6}
G-	giga-	10^{9}

A

A16 space — VXIbus address space equivalent to the VME 64 KB short address space. In VXI, the upper 16 KB of A16 space is allocated for use by VXI devices configuration registers. This 16 KB region is referred to as VXI configuration space.

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.

address window — A portion of address space that can be accessed from the application program.

ANSI — American National Standards Institute

ASIC — application-specific integrated circuit

B

B — bytes

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.

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 Timeout Unit — A functional module that times the duration of each data transfer and terminates the cycle if the duration is excessive. Without the termination capability of this module, a bus master attempt to access a nonexistent slave could result in an indefinitely long wait for a slave response.

byte order — How bytes are arranged within a word or how words are arranged within a longword. Motorola ordering stores the most significant (MSB) byte or word first, followed by the least significant byte (LSB) or word. Intel ordering stores the LSB or word first, followed by the MSB or word.

C

CLK10	A 10 MHz, ± 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.
Commander	A message-based device which is also a bus master and can control one or more Servants.
configuration registers	A set of registers through which the system can identify a module device type, model, manufacturer, address space, and memory requirements. In order to support automatic system and memory configuration, the VXIbus specification requires that all VXIbus devices have a set of such registers.

D

DMA	Direct Memory Access; a method by which data is transferred between devices and internal memory without intervention of the central processing unit.
DRAM	Dynamic RAM (Random Access Memory); storage that the computer must refresh at frequent intervals.
driver window	A region of address space that is decoded by the VXIpc-850 for use by the NI-VXI software.

E

ECL	Emitter-Coupled Logic
EEPROM	Electronically Erasable Programmable Read Only Memory
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.

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.

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

IEEE	Institute of Electrical and Electronics Engineers
I/O	input/output; the techniques, media, and devices used to achieve communication between machines and users.
interrupt	A means for a device to request service from another device.
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

K

KB	kilobytes of memory

L

logical address	An 8-bit number that uniquely identifies each VXIbus device in a system. It defines the A16 register address of a device, and indicates Commander and Servant relationships.

M

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.
MB	megabytes of memory
message-based device	An intelligent device that implements the defined VXIbus registers and communication protocols. These devices are able to use Word Serial Protocol to communicate with one another through communication registers.
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.
MTBF	Mean Time Between Failure

N

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.

R

register-based device	A Servant-only device that supports VXIbus configuration registers. Register-based devices are typically controlled by message-based devices via device-dependent register reads and writes.

RESMAN	The name of the National Instruments Resource Manager in NI-VXI bus interface software. See *Resource Manager*.
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.
retry	An acknowledge by a destination that signifies that the cycle did not complete and should be repeated.

S

s	seconds
Servant	A device controlled by a Commander; there are message-based and register-based Servants.
Shared Memory Protocol	A communication protocol that uses a block of memory that is accessible to both a client and a server. The memory block operates as a message buffer for communications.
SIMM	Single In-line Memory Module
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.
Slot 0 device	A device configured for installation in Slot 0 of a VXIbus mainframe. This device is unique in the VXIbus 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 VXIbus backplane, or both.

T

trigger	Either TTL or ECL lines used for intermodule communication.
TTL	Transistor-Transistor Logic

U

user window	A region of address space reserved by the VXIpc-850 for use via the NI-VXI low-level function calls. `MapVXIAddress()` uses this address space to allocate regions for use by the `VXIpeek()` and `VXIpoke()` macros.

V

VIC or VICtext	VXI Interactive Control Program, a part of the NI-VXI bus interface software package. Used to program VXI devices, and develop and debug VXI application programs.
VME	Versa Module Eurocard or IEEE 1014
VMEbus 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 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/VXIbus backplane, or both.
VXIbus	VMEbus Extensions for Instrumentation
VXIedit or VXItedit	VXI Resource Editor program, a part of the NI-VXI bus interface software package. Used to configure the system, edit the manufacturer name and ID numbers, edit the model names of VXI and non-VXI devices in the system, as well as the system interrupt configuration information, and display the system configuration information generated by the Resource Manager.
VXIinit	A program in the NI-VXI bus interface software package that initializes the board interrupts, shared RAM, VXI register configurations, and bus configurations.

W

Word Serial Protocol	The simplest required communication protocol supported by message-based devices in a VXIbus system. It utilizes the A16 communication registers to transfer data using a simple polling handshake method.
write posting	A mechanism that signifies that a device will immediately give a successful acknowledge to a write transfer and place the transfer in a local buffer. The device can then independently complete the write cycle to the destination.

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