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Getting Started with Your VXIpc-386™ and the NI-VXI™ Software for MS-DOS



August 1991 Edition

Part Number 320291-01

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Preface

This manual contains instructions for installing and configuring the National Instruments VXIpc-386 embedded computer and the NI-VXI software. This manual is meant to be used with the *NI-VXI DOS Utilities Reference Manual* (part number 320323-01), the *NI-VXI C Software Reference Manual* (part number 320307-01), and the *NI-VXI QuickBASIC Software Reference Manual* (part number 320328-01).

Organization of the Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, describes the VXIpc-386 kit, contains a picture of the two types of VXIpc-386 modules, lists the contents of your kit, and lists optional equipment and software.
- Chapter 2, *VXIpc-386 Configuration and Installation*, contains step-by-step instructions for configuring and installing the VXIpc-386 kit.
- Chapter 3, *BIOS Setup*, describes how to set up the VXIpc-386 basic input/output system (BIOS).
- Chapter 4, *NI-VXI Software Installation and Configuration*, describes the programs and files located on the NI-VXI distribution diskettes, and contains step-by-step instructions for installing and configuring the NI-VXI MS-DOS software.
- Appendix A, *Front Panel Indicators*, describes the function of the VXIpc-386 front panel LEDs.
- Appendix B, *Connectors*, describes the VXIpc-386 front panel and VXIbus connector pinouts.
- Appendix C, *Specifications*, lists various module specifications of the VXIpc-386, such as physical dimensions and power requirements.
- Appendix D, *Modifying and Installing I/O Expansion Boards*, contains instructions on modifying and installing I/O expansion boards in the VXIpc-386/2.
- Appendix E, *VXIpc-386 Hardware Configuration*, contains hardware configuration information about the VXIpc-386 regarding memory map locations, interrupt lines, and DMA channels.
- Appendix F, *Customer Communication*, contains forms for you to complete to facilitate communication with National Instruments concerning our products.

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Conventions Used in This Manual

Throughout this manual, the following conventions are used to distinguish elements of text:

bold	Bold text denotes menus, menu items, or dialog box buttons or options.
italic	Italic text denotes emphasis, a cross reference, or an introduction to a key concept.
`monospace`	Text in monospace font is used for the proper names of programs, subprograms, filenames, and extensions.

Abbreviations

The following abbreviations are units of measure that are used in the text of this manual.

Ω	ohms
°	degrees
%	percent
C	Celsius
in.	inch
k	kilo- (10^3)
M	mega-(10^6)
m	meter
µsec	microseconds
MHz	megahertz
V	volts
W	watts

How to Use This Documentation Set

Use this manual as a guide to installing and configuring the VXIpc-386, then use the interactive utilities described in the *NI-VXI DOS Utilities Reference Manual* to learn more about the capabilities of the NI-VXI software. Finally, use the *NI-VXI C Software Reference Manual* or the *NI-VXI QuickBASIC Software Reference Manual* to develop your applications.

Use the *NI-488.2 MS-DOS Software Reference Manual* as a guide for installing, configuring, and using the NI-488.2 GPIB Talker/Listener/Controller software.

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Related Documentation

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

- *IEEE Standard for a Versatile Backplane Bus: VMEbus*, ANSI/IEEE Standard 1014-1987
- *VXIbus System Specification*, VXI-1, Rev. 1.3, VXIbus Consortium
- *VXIbus Mainframe Extender Specification*, VXI-6, Rev. 1.0, VXIbus Consortium

Customer Communication

We appreciate communicating with the people who use our products. We are also very interested in hearing about the applications you develop using our products. To make it easy for you to communicate with us, this manual contains forms for you to complete. These forms are located in Appendix F, *Customer Communication*, at the back of this manual.

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Contents

Chapter 1
Introduction 1-1
What Your Kit Should Contain 1-2
Optional Equipment 1-3
Optional Software 1-3

Chapter 2
VXIpc-386 Configuration and Installation 2-1
Factory Configuration 2-1
Configuring the VXIpc-386 2-2
Configuration Procedure 2-3
Configuration Options 2-4
VXIbus Slot and External CLK10 Configuration Options 2-4
External Trigger Input Configuration 2-8
External Audio/Trigger Output Configuration 2-9
Installed System RAM Configuration 2-9
80387 Math Coprocessor Configuration 2-10
Installing and Starting Up the VXIpc-386 2-11

Chapter 3
BIOS Setup 3-1

Chapter 4
NI-VXI Software Installation and Configuration 4-1
NI-VXI Software Overview 4-1
Main Programs and Files 4-1
Additional Programs and Files 4-2
Installing the Software 4-4
Configuring the NI-VXI Software 4-5
Running VXIEDIT 4-5
Logical Address Configuration 4-7
Logical Address 4-7
Device Type 4-7
Address Space 4-8
VXI Shared RAM 4-8
Slave Block Transfer Mode 4-8
Slave Supervisory Access Only 4-9
Resource Manager Delay 4-9
Bus Configuration 4-9
Bus Request Level 4-10
Fair Requester Timeout 4-10
Bus Release Mechanism 4-10
Bus Arbitration 4-10
Local Bus Timeout 4-10
VXIbus Timeout 4-10

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Device Configuration 4-11
SYSRESET Action 4-11
Servant Area Size 4-11
Protocol Register 4-12
Read Protocol Response 4-12
Number of Handlers 4-12
Number of Interrupters 4-12
Editing VXIEDIT and Re-intializing the Hardware 4-12
Developing Your Application Program 4-12

Appendix A
Front Panel Indicators A-1

Appendix B
Connectors B-1
Keyboard Connector B-1
VGA Connector B-2
COM1 Connector B-3
COM2/RGB Connector B-4
LPT Connector B-5
Floppy Disk Drive Connector B-7
GPIB B-9
External CLK10 Connector B-11
External Trigger Input Connector B-12
External Audio/Trigger Output Connector B-13
VXIbus Connectors B-14

Appendix C
Specifications C-1

Appendix D
Modifying and Installing I/O Expansion Boards D-1

Appendix E
VXIpc-386 Hardware Configuration E-1

Appendix F
Customer Communication F-1

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Figures

Figure 1-1. VXIpc-386/2 and VXIpc-386/1 Modules 1-1

Figure 2-1. VXIpc-386 Parts Locator Diagram 2-2
Figure 2-2. MODID Signal Termination Settings 2-5
Figure 2-3. System Controller Settings 2-5
Figure 2-4. CLK10 Circuit Factory Configuration 2-6
Figure 2-5. VXIbus CLK10 Settings 2-7
Figure 2-6. External CLK10 Settings 2-7
Figure 2-7. External CLK10 Termination Settings 2-7
Figure 2-8. External Trigger Input Circuit 2-8
Figure 2-9. External Trigger Input Termination Settings 2-8
Figure 2-10. VXIpc-386 Front Panel 2-12

Figure 4-1. VXIEDIT Main Menu 4-6
Figure 4-2. VXIpc-386 Logical Address Configuration Editor 4-7
Figure 4-3. VXIpc-386 Bus Configuration Editor 4-9
Figure 4-4. VXIpc-386 Device Configuration Editor 4-11

Figure B-1. KEYBOARD Connector B-1
Figure B-2. VGA Connector B-2
Figure B-3. COM1 Connector B-3
Figure B-4. COM2/RGB Connector B-4
Figure B-5. LPT Connector B-5
Figure B-6. DISK DRIVE Connector B-7
Figure B-7. GPIB Connector B-9
Figure B-8. EXT CLK Connector B-11
Figure B-9. TRG IN Connector B-12
Figure B-10. AUDIO/TRG OUT Connector B-13
Figure B-11. VXIbus P1 Connector B-14
Figure B-12. VXIbus P2 Connector B-20

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Tables

Table 2-1. VXIpc-386 Factory Configuration 2-1
Table 2-2. VXIbus Slot Position and External CLK10 Configuration Options 2-4
Table 2-3. External Audio/Trigger Output Configuration Options 2-9
Table 2-4. Installed RAM Configuration Options 2-9

Table 3-1. Default BIOS Configuration Options 3-2

Table 4-1. VXI Shared RAM Options 4-8

Table A-1. Front Panel LED Indications for RM Operation A-1

Table B-1. KEYBOARD Connector Signals B-1
Table B-2. VGA Connector Signals B-2
Table B-3. COM1 Connector Signals B-3
Table B-4a. COM2/RGB Connector COM2 Signals B-4
Table B-4b. COM2/RGB Connector RGB Signals B-4
Table B-5. LPT Connector Signals B-5
Table B-6. DISK DRIVE Connector Signals B-7
Table B-7. GPIB Connector Signals B-9
Table B-8. EXT CLK Connector Signals B-11
Table B-9. TRG IN Connector Signals B-12
Table B-10. AUDIO/TRG OUT Connector Signals B-13
Table B-11. VXIbus P1 Connector Signals, Row A B-14
Table B-12. VXIbus P1 Connector Signals, Row B B-16
Table B-13. VXIbus P1 Connector Signals, Row C B-19
Table B-14. VXIbus P2 Connector Signals, Row A B-20
Table B-15. VXIbus P2 Connector Signals, Row B B-22
Table B-16. VXIbus P2 Connector Signals, Row C B-24

Table E-1. VXIpc-386 Memory Map E-1
Table E-2. VXIpc-386 Interrupt Lines Use E-2
Table E-3. VXIpc-386 DMA Channel Use E-3

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Chapter 1
Introduction

This chapter describes the VXIpc-386 kit, contains a picture of the two types of VXIpc-386 modules, lists the contents of your VXIpc-386 kit, and lists optional equipment and software.

The VXIpc-386 is an embedded computer based on the Industry Standard Architecture (ISA). The VXIpc-386 is a high-performance, easy-to-use platform for VXIbus systems, featuring complete VXI functionality through interactive utilities and C or QuickBASIC function calls. In addition, the VXIpc-386 has an IEEE-488 interface that is compatible with the NI-488.2 architecture.

The VXIpc-386/1 requires one VXIbus slot, and contains an internal hard disk drive. An optional 3.5 in. external floppy drive (EFD) is available for transferring files between the VXIpc-386 and other PCs.

The VXIpc-386/2 is available in various combinations of internal hard disk drive, internal floppy disk drive, and PC-compatible I/O expansion kits. The optional external floppy drive is compatible with VXIpc-386/2 models without an internal floppy drive.

Figure 1-1 shows the VXIpc-386/2 (left) and the VXIpc-386/1.

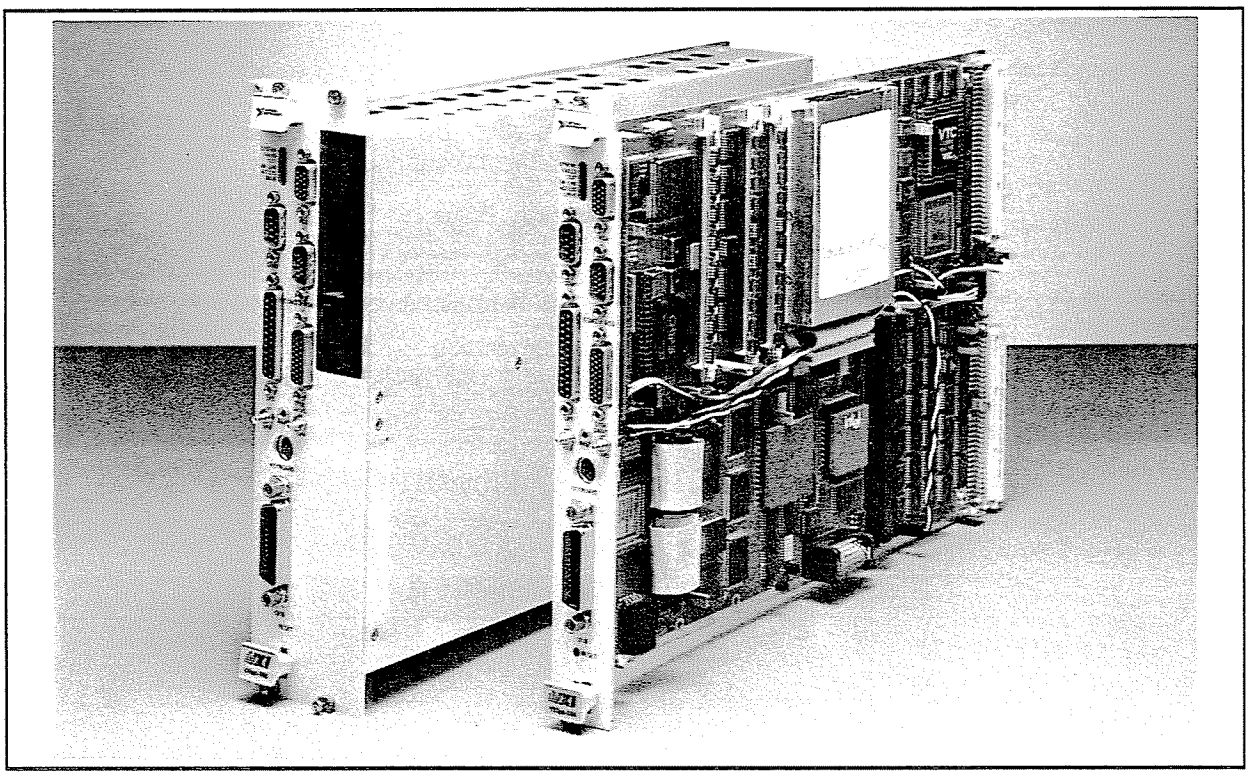


Figure 1-1. VXIpc-386/2 and VXIpc-386/1 Modules

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What Your Kit Should Contain

Your kit should contain the following components:

Component	Part Number
VXIpc-386 Module	181010-XY0 or 181480-XY0
Keyboard Adapter Cable	181027-01
Customer Registration Form	320143-01
Microsoft DOS Kit	776376-11
NI-VXI MS-DOS for the VXIpc-386 Kit	776459-01
NI-VXI Distribution Disks for MS-DOS for VXIpc-386	
Disk 1	422780-72
Disk 2	422781-72
Getting Started with Your VXIpc-386 and the NI-VXI Software for MS-DOS	320291-01
NI-VXI DOS Utilities Reference Manual	320323-01
NI-VXI C Software Reference Manual	320307-01
NI-VXI QuickBASIC Software Reference Manual	320328-01
NI-488.2 MS-DOS Handler for the VXIpc-386 Kit	776509-01
VXIpc-386 NI-488.2 MS-DOS Handler Distribution Disk	422786-72
NI-488.2 MS-DOS Software Reference Manual	320282-01
VXIpc-386 Documentation Notice: AT-GPIB and MS-DOS Compatibility	320291-90
Universal Language Interface Using HP-Style Calls	320135-90

Make sure each of these items is in your kit. If any item is missing, contact National Instruments.

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Optional Equipment

Component	Part Number
VXIpc-EFD External 3.5 in. Floppy Drive (compatible with models without an internal floppy drive)	776404-01
COM2 Adapter Cable	181364-01
I/O Expansion Slot Panel Bracket, Blank	181300-01
Single-Shielded GPIB Cables:	
Type X1 Cable – 1 m	763001-01
Type X1 Cable – 2 m	763001-02
Type X1 Cable – 4 m	763001-03
Double-Shielded GPIB Cables:	
Type X2 Cable – 1 m	763061-01
Type X2 Cable – 2 m	763061-02
Type X2 Cable – 4 m	763061-03

Optional Software

Software	Part Number
LabWindows 2.0 Software System	776473-11
LabWindows VXI Library for the VXIpc-386	776405-01

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Chapter 2
VXIpc-386 Configuration and Installation

This chapter describes how to configure and install the VXIpc-386. Read this chapter and install the VXIpc-386 before installing the NI-VXI software. The software installation is described in Chapter 4, *NI-VXI Software Installation and Configuration.* Because the VXIpc-386 built-in GPIB port is compatible with the industry-standard AT-GPIB plug-in GPIB interface board for PC AT computers, please refer to *Getting Started with Your AT-GPIB and the NI-488.2 MS-DOS Handler* (part number 320284-01) for information about using the capabilities of the AT-GPIB in your system.

Factory Configuration

The VXIpc-386 is factory-configured to function as a VXIbus Slot 0 System Controller. This is the most commonly used configuration. Table 2-1 shows the details of the factory configuration.

Table 2-1. VXIpc-386 Factory Configuration

Item	Factory Configuration
Slot 0:	
System Controller	Enabled (Bus Arbiter and Bus Timer Soft-Configured)
CLK10	Onboard source drives backplane
MODID Terminator	16.9 KΩ pull-up
External CLK10:	
I/O	Disabled
Termination	Not terminated
External Trigger Input	Not terminated
External Audio/Trigger Out	Trigger Out
System RAM	Per customer order
Math Coprocessor	Per customer order

The System Controller functions include the System Clock (SYSCLK) driver, System Reset (SYSRESET) driver, Bus Arbiter, and Bus Timer. The Bus Arbiter and Bus Timer are soft-configured, but are enabled or disabled by the Slot 0 System Controller configuration.

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The VXIpc-386 factory configuration can be altered, if necessary, to match your system requirements by changing the jumper settings as described in this chapter, and by running the `VXIEDIT` application as described in Chapter 4. The configurable features not listed in Table 2-1 are soft-configured by `VXIEDIT`.

Configuring the VXIpc-386

This section describes how to modify the VXIpc-386 factory configuration.

Unless you have special system configuration requirements, you can install and use the VXIpc-386 without altering the factory configuration. Unless you need to alter the configuration shown in Table 2-1, skip the following sections and continue with *Installing and Starting Up the VXIpc-386*, later in this chapter.

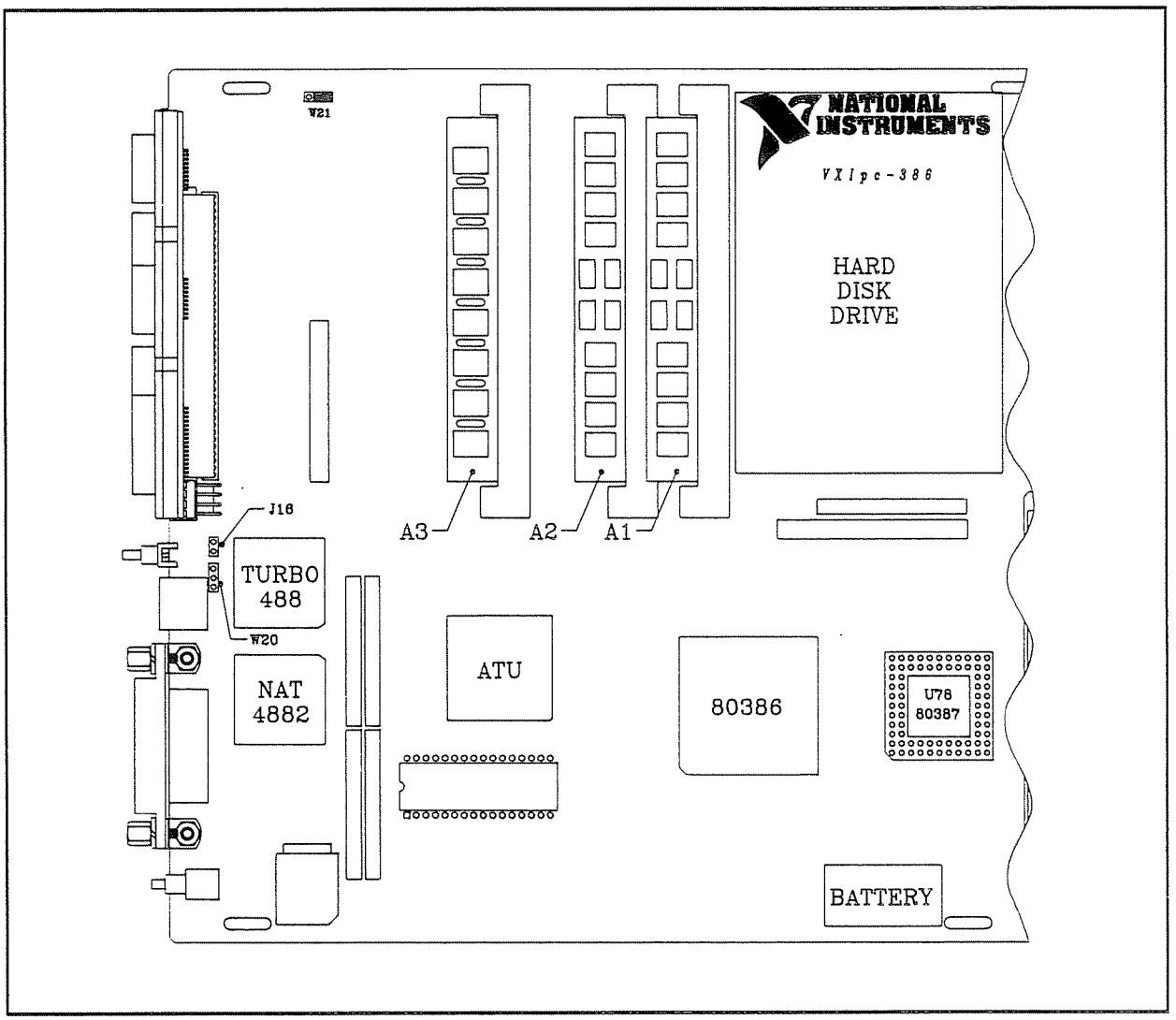


Figure 2-1. VXIpc-386 Parts Locator Diagram (continues)

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Configuration Procedure

Follow these steps to modify the factory configuration:

1. Ground yourself and the VXIpc-386. The VXIpc-386 can be damaged by static discharge. You are less likely to damage the VXIpc-386 if you place it on a properly grounded anti-static mat and use a wriststrap.
2. Remove the screws that secure the right side cover. Remove the cover to expose the circuit card.
3. Alter the configuration as required, as described in the following section.
4. Replace the cover and the screws.

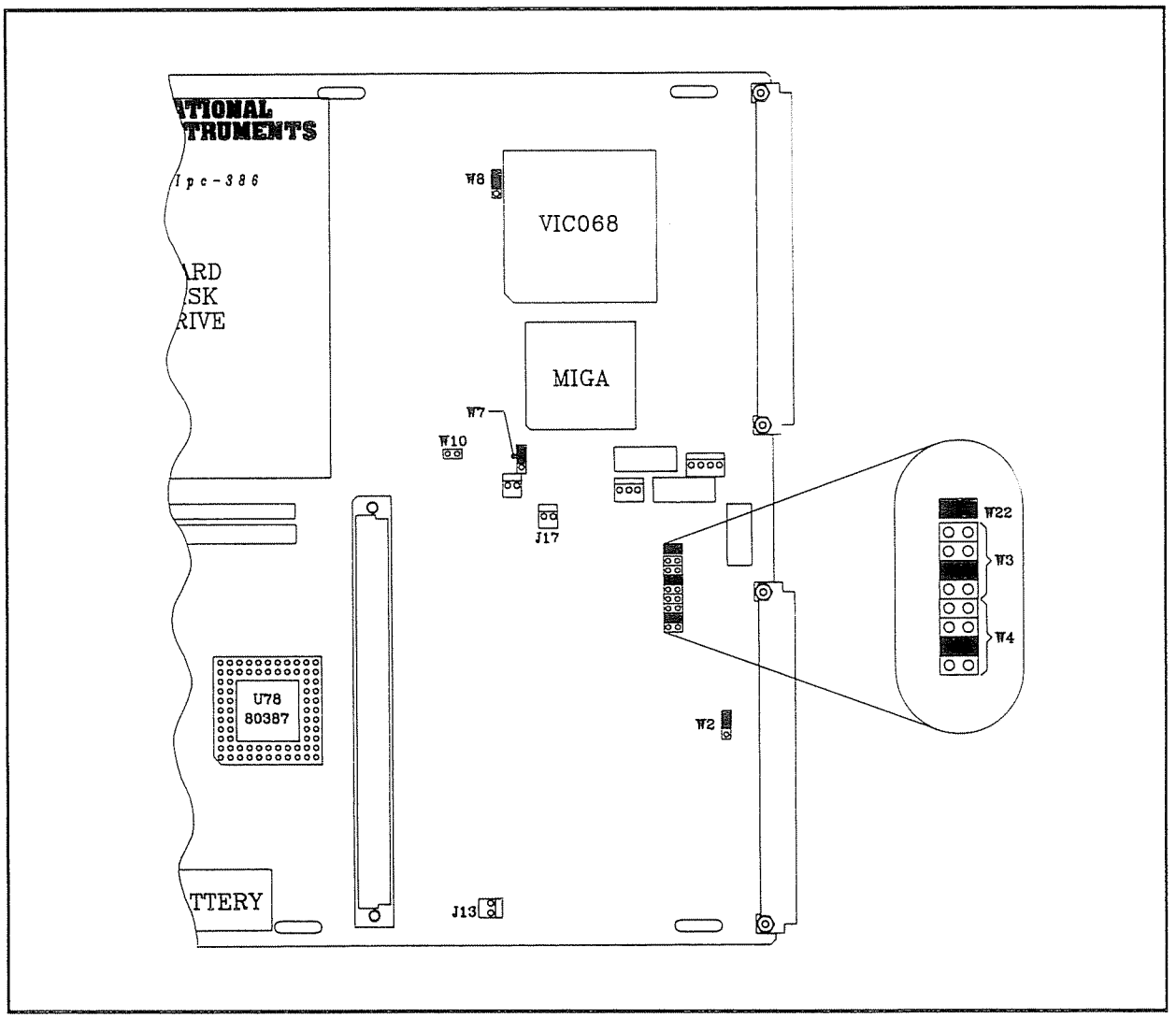


Figure 2-1. VXIpc-386 Parts Locator Diagram (continued)

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Configuration Options

Figure 2-1 shows the location of the VXIpc-386 configurable components, and their physical location relative to some of the major circuit components. The factory jumper settings are indicated in Figure 2-1 by the black rectangles. The jumper headers not shown in Figure 2-1 are not user configurable, and should not be populated with shunt jumpers.

Shunt jumpers should always be installed on W7, W21, and W22 as shown.

VXIbus Slot and External CLK10 Configuration Options

The VXIbus slot and external CLK10 configuration options are inter-dependent, so they are presented here together.

The external CLK10 interface is the SMB connector labeled *CLK* on the VXIpc-386 front panel. The external CLK10 signal is a TTL level signal.

The slot position and external CLK10 configuration options are shown in Table 2-2.

Warning: Installing a VXIpc-386 configured for Slot 0 operation into any slot other than Slot 0 can damage the VXIpc-386, the backplane, and the Slot 0 device.

Table 2-2. VXIbus Slot Position and External CLK10 Configuration Options

Configuration	VXIbus Slot	External CLK10	Applicable Configuration Figures W2	W8	W3/W4	W20	J16
A*	Slot 0	Disabled	2-2a	2-3a	2-5a	2-6a	2-7a
B	Slot 0	Output	2-2a	2-3a	2-5a	2-6b	2-7a
C	Slot 0	Input, Unterminated	2-2a	2-3a	2-5b	2-6c	2-7a
D	Slot 0	Input, 50Ω Terminated	2-2a	2-3a	2-5b	2-6c	2-7b
E	Non-Slot 0	Disabled	2-2b	2-3b	2-5c	2-6a	2-7a
F	Non-Slot 0	Output	2-2b	2-3b	2-5c	2-6b	2-7a
* Factory configuration							

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W2 configures the MODID signal termination for Slot 0/Non-Slot 0 operation. When configured for Slot 0 operation (Figure 2-2a), W2 causes the MODID signal to be terminated with a 16.9 kΩ pull-up resistor. When configured for Non-Slot 0 operation (Figure 2-2b), W2 causes the MODID signal to be terminated with a 825 Ω pull-down resistor.

Figure 2-2 shows the possible settings for W2.

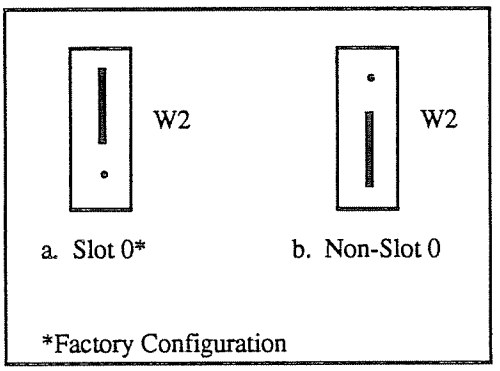


Figure 2-2. MODID Signal Termination Settings

W8 configures the System Controller for Slot 0/Non-Slot 0 operation. When configured for Slot 0 operation (Figure 2-3a), W8 enables the VXIpc-386 System Controller functions (SYSCLK and SYSRESET drivers, the Bus Arbiter and Bus Timer). When configured for Non-Slot 0 operation (Figure 2-3b), W8 disables the System Controller functions.

Figure 2-3 shows the possible settings for W8.

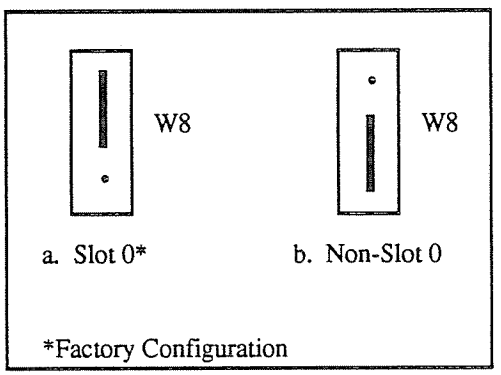


Figure 2-3. System Controller Settings

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The VXIpc-386 CLK10 circuit is shown in Figure 2-4, with the factory jumper configuration. W3 and W4 configure the VXIbus CLK10 interface, while W20 and J16 configure the External CLK10 interface.

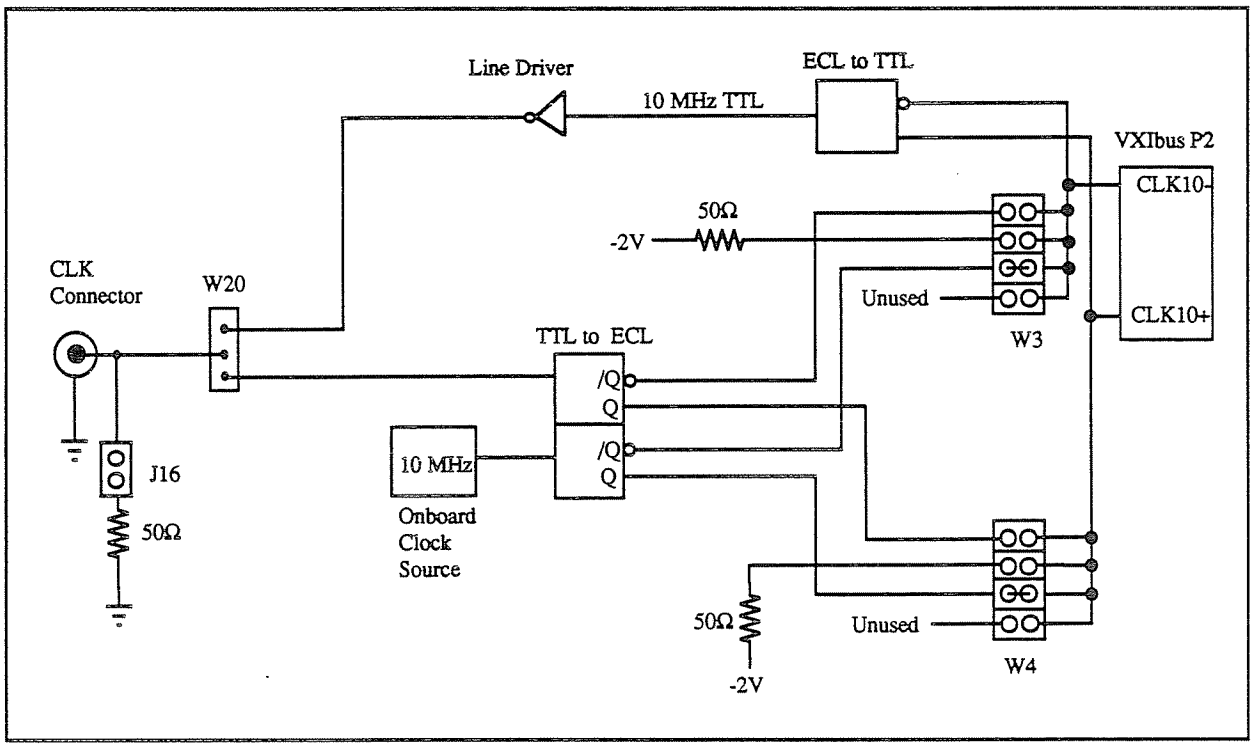


Figure 2-4. CLK10 Circuit Factory Configuration

In configuration A (see Table 2-1), an onboard CLK10 reference source drives the differential ECL CLK10 backplane signals. Configuration B is similar to A, except that the VXIpc-386 also drives the External CLK10 connector with a TTL CLK10 reference signal.

In configuration C, an external TTL CLK10 reference source drives the backplane CLK10 signals, and the onboard source is disabled. Configuration D is similar to C, except that the external CLK10 reference is terminated with a 50Ω resistor to ground.

In configuration E, the VXIpc-386 accepts the CLK10 signal from the backplane, terminating the differential ECL CLK10 signals with 50Ω resistors to -2V. Configuration F is similar to E, except that the VXIpc-386 also drives the External CLK10 connector with a TTL CLK10 reference signal.

Figure 2-5 shows the possible settings for W3 and W4. Figure 2-6 shows the possible settings for W20. Figure 2-7 shows the possible settings for J16.

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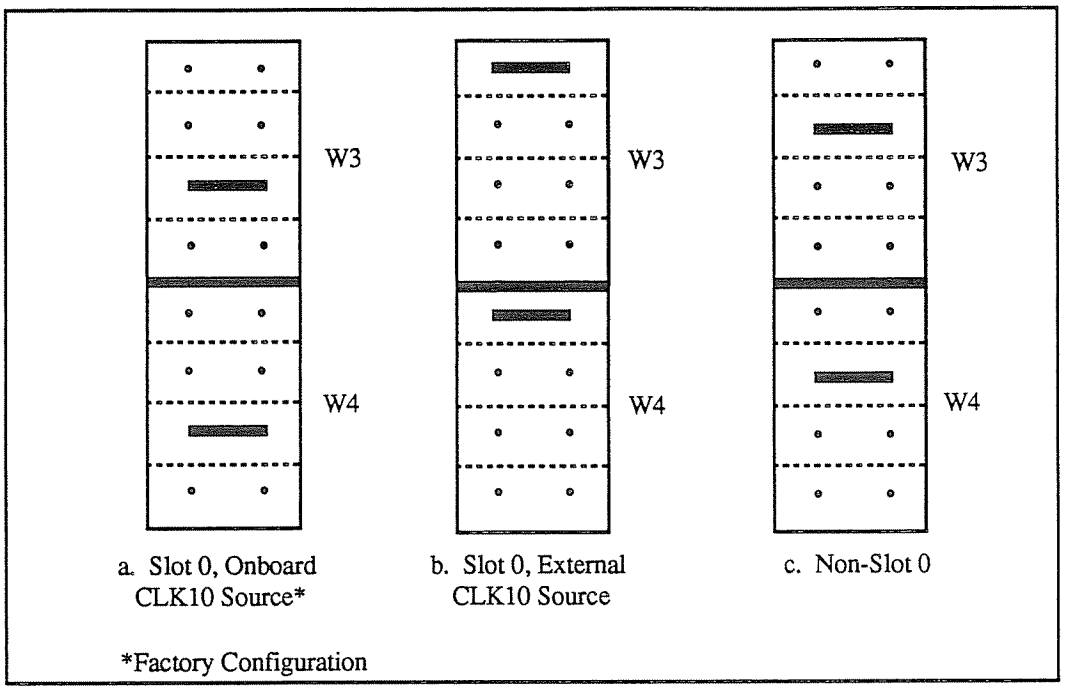


Figure 2-5. VXIbus CLK10 Settings

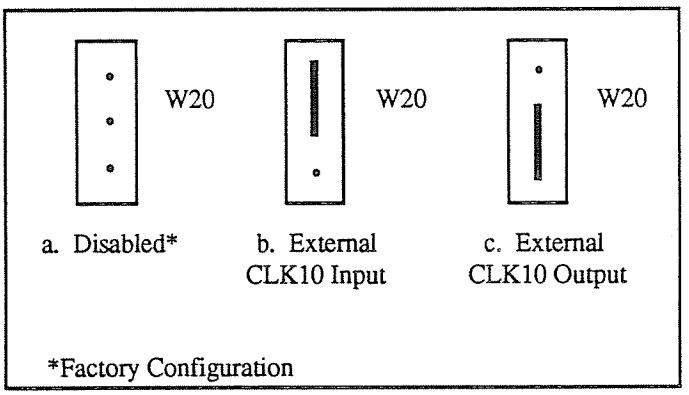


Figure 2-6. External CLK10 Settings

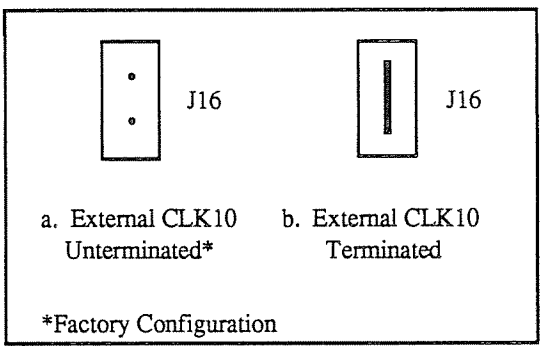


Figure 2-7. External CLK10 Termination Settings

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External Trigger Input Configuration

The external TTL trigger input interface is the SMB connector labeled *TRG IN* on the VXIpc-386 front panel. Figure 2-8 shows the external trigger input circuit.

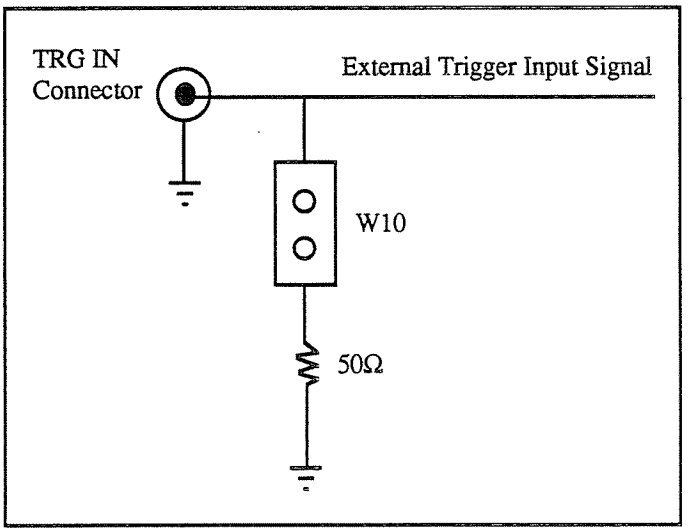


Figure 2-8. External Trigger Input Circuit

Optionally, the external TTL trigger input can be terminated with a 50Ω resistor to ground. The external trigger input termination settings are shown in Figure 2-9.

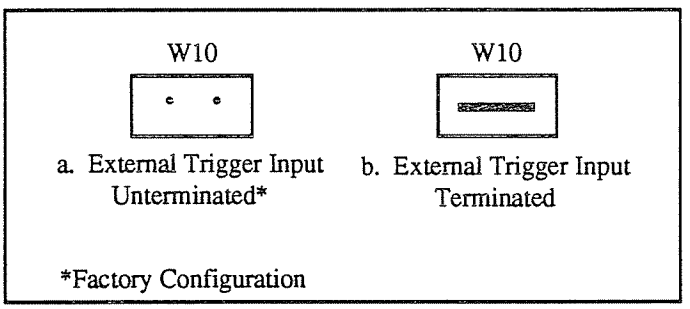


Figure 2-9. External Trigger Input Termination Settings

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External Audio/Trigger Output Configuration

The external audio/trigger output interface is the SMB connector labeled *AUDIO/TRG OUT* on the VXIpc-386 front panel.

The external audio/trigger output can be configured as either an audio output or a TTL trigger output. The audio/trigger output is connected to the circuit card by a twisted-pair cable. The audio/trigger output is configured by connecting the cable to either J13 or J17. The configuration options are shown in Table 2-3.

Table 2-3. External Audio/Trigger Output Configuration Options

External Audio/ Trigger Output	Connected to
Trigger Out*	J17
Audio Out	J13

* Factory configuration

Installed System RAM Configuration

The amount of installed RAM is factory configured per customer order. The amount of installed RAM can be changed on VXIpc-386/1 models by installing dynamic RAM single in-line memory modules (DRAM SIMMs) in positions A1 and A2, as shown in Table 2-4 and Figure 2-1.

Warnings:

1. SIMM assembly A3 is *not* a user-serviceable item. Replacing A3 with a commercially available SIMM will damage the VXIpc-386.
2. Do not attempt to change the factory RAM configuration of VXIpc-386/2 models. Disassembling the internal brackets in an attempt to expose the DRAM SIMM sockets will void your warranty.

Table 2-4. Installed RAM Configuration Options

Installed RAM	A2	A1
1 megabyte	256K x 36	Not Installed
2 megabytes	256K x 36	256K x 36
4 megabytes	1M x 36	Not Installed
5 megabytes	1M x 36	256K x 36
8 megabytes	1M x 36	1M x 36

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Use Micron part number MT8C36256-10M or equivalent 256K x 36 SIMMs and/or Toshiba part number THM361020S-10 or equivalent 1M x 36 SIMMs.

Note: Always reconfigure the VXIpc-386/1 to the factory DRAM configuration shown on the ID label before returning it to the factory for repairs or upgrades.

80387 Math Coprocessor Configuration

An 80387 math coprocessor is installed at the factory, if ordered as an option.

Warning: Do not attempt to install or remove a math coprocessor in VXIpc-386/2 models. Disassembling the internal brackets in an attempt to expose the 80387 socket will void your warranty.

You can install an Intel 387DX or equivalent math coprocessor in a VXIpc-386/1 yourself, by following these steps:

1. Place the 80387 (in its shipping package) on the anti-static mat with the VXIpc-386.
2. Remove the 80387 from its anti-static packaging, and examine the connector pins on the underside. If any pins are bent, carefully straighten them with needle-nosed pliers.
3. Locate the 80387 socket (U78) on the VXIpc-386 (See Figure 2-1).

Warning: Be sure to orient the 80387 correctly before inserting it in the socket. If you insert the chip the wrong way, the 80387 and the VXIpc-386 will be damaged.

4. Orient the 80387 so that the corner notch on the 80387 matches the position of the corner notch in Figure 2-1.

Warning: Avoid excessive pressure while inserting the 80387. Bending the circuit card could damage the VXIpc-386.

5. Insert the 80387 into the socket, pressing firmly and evenly to fully seat the pins. The pins are barely visible when the chip is fully inserted.

Note: Always reconfigure the VXIpc-386/1 to the factory math coprocessor configuration shown on the ID label before returning it to the factory for repairs or upgrades.

If you have finished configuring the VXIpc-386, you are now ready to install it in your mainframe.

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Installing and Starting Up the VXIpc-386

The following installation instructions apply to the VXIpc-386. Refer to your mainframe user manual for further instructions regarding mainframe configuration and module installation. Refer to Figure 2-10 to locate the VXIpc-386 front panel connectors. The connectors are described in more detail in Appendix B, *Connectors*.

1. Turn off the mainframe power.

Warning: Installing a VXIpc-386 configured for Slot 0 operation into any slot other than Slot 0 can result in damage to the VXIpc-386, the backplane, and the Slot 0 device.

2. If the VXIpc-386 is configured for Slot 0 operation, install it in Slot 0. If the VXIpc-386 is configured as a Non-Slot 0 device, install it in any slot other than Slot 0. Refer to your mainframe user manual for instructions regarding slot configuration.

3. Tighten the retaining screws at the top and bottom of the front panel.

4. Connect the keyboard to the KEYBOARD connector. Use the keyboard adapter cable (provided with your VXIpc-386) to adapt AT-style keyboards to the VXIpc-386 mini-DIN connector.

5. Connect the VGA monitor video cable to the VGA connector and tighten the screws.

6. On VXIpc-386 models without an internal floppy drive, connect the optional external floppy drive (EFD) to the DISK DRIVE connector. The EFD is not compatible with models that have an internal floppy drive.

7. Connect serial devices to the COM1 or COM2 connectors, if required by your system configuration. Use the COM2 adapter cable (available as an accessory) to attach serial devices to COM2.

8. Connect parallel devices to the LPT connector, if required by your system configuration.

9. Connect the external CLK10 signal to the CLK connector, if required by your system configuration.

10. Connect the external trigger input signal to the TRG IN connector, if required by your system configuration.

11. Connect the external audio or trigger output signal to the AUDIO/TRG OUT connector, if required by your system configuration.

12. To start up the VXIpc-386, turn on the mainframe power. Power must also be applied to any peripherals, such as the monitor. Once power is applied to the system, the BIOS boot sequence should begin displaying startup messages on the monitor.

The front panel LED indicators also provide information about the VXIpc-386 and VXIbus system status. The SYSFAIL and FAILED LEDs remain lit until the VXIpc-386 initialization program `VXIINIT.EXE` is run. See Chapter 4, *NI-VXI Software Installation and Configuration*, for more information about `VXIINIT`. See Appendix A, *Front Panel Indicators*, for more information about the front panel LED operation.

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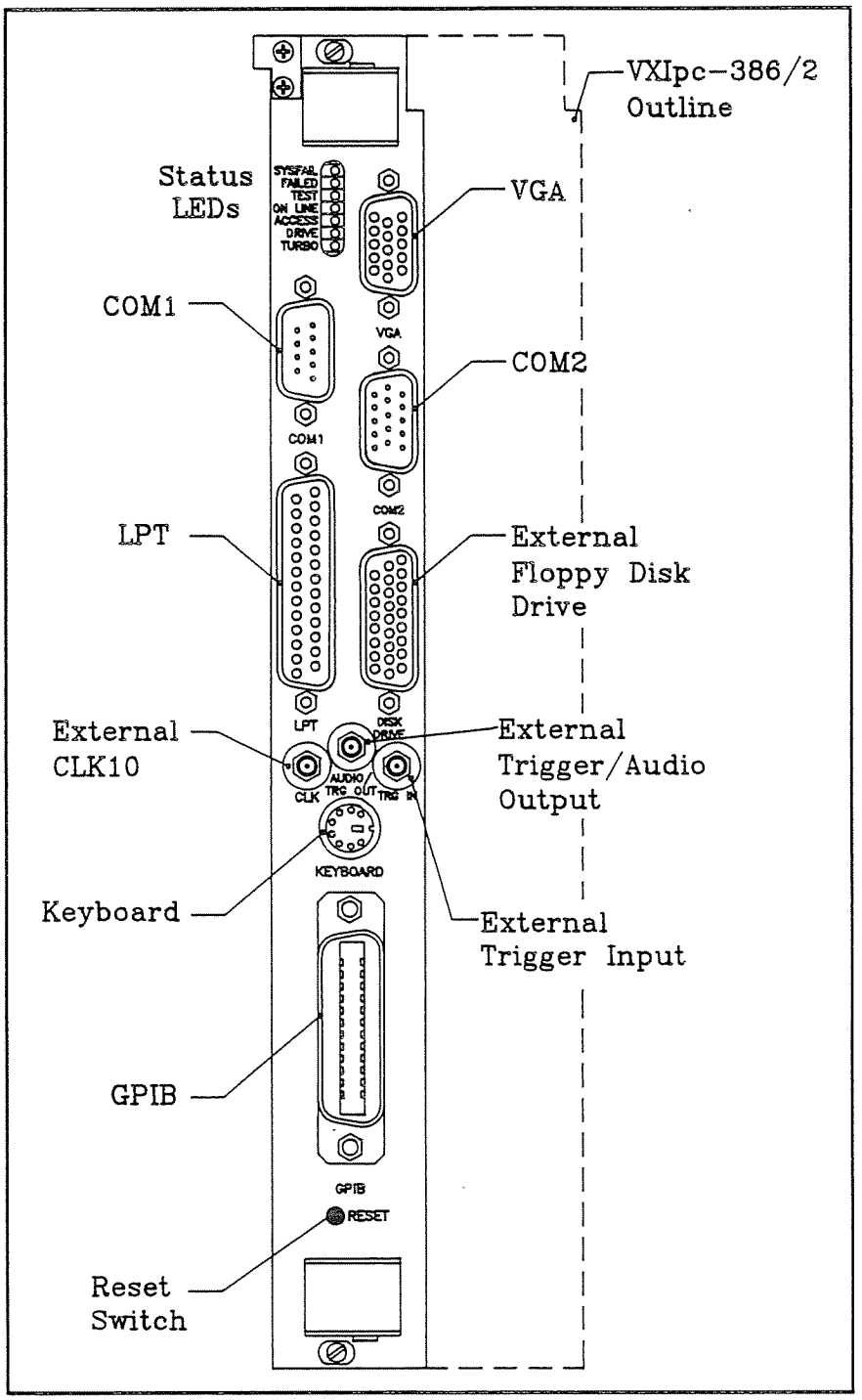


Figure 2-10. VXIpc-386 Front Panel

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Chapter 3
BIOS Setup

This chapter describes how to set up the VXIpc-386 basic input/output system (BIOS). The VXIpc-386 uses the Quadtel AT Compatible Enhanced BIOS. The BIOS defines the way in which software interacts with the VXIpc-386 hardware. The BIOS has a number of setup parameters that contain the VXIpc-386 system configuration information.

The BIOS setup parameters are stored in the clock CMOS RAM. You use the BIOS utility *Setup* (part of the Quadtel Extended BIOS Software System) to modify the time-of-day, date, floppy and hard disk types, processor speed, and shadow RAM operation.

The BIOS parameters are factory-configured for proper operation. Unless you have special BIOS configuration requirements, you can proceed to Chapter 4, *NI-VXI Software Installation and Configuration.*

Occasionally, you may encounter a BIOS-related error message that requires you to run *Setup*. You may also need to change one or more of the BIOS parameters for compatibility with a software application. If you need to run *Setup,* follow these steps:

1. Press <Ctrl>–<Alt>–<S> simultaneously to display the Extended BIOS Software main window. This window also appears if you press <F2> after a power-on self-test error is displayed.

2. Select *Setup*, using the Up/Down Arrow and <Enter> keys, to display the Extended BIOS Setup window.

3. Use the Up/Down Arrow or <Tab> keys to select the item you want to change. Press <F5> to select the previous (smaller) value, <F6> to select the next (larger) value, or <F9> to automatically configure the selected item.

4. When you have finished editing the configuration parameters, save them by pressing <F10>.

5. Press <Esc> to exit Setup. If you have not saved your changes, you can do so at this time.

6. Press <Esc> to exit the Extended BIOS Software main window. The VXIpc-386 will restart.

The default BIOS configuration parameters are shown in Table 3-1.

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Table 3-1. Default BIOS Configuration Parameters

Parameter	Configuration
System Memory	Press <F9> to Auto Configure
Extended Memory	Press <F9> to Auto Configure
EMS Memory	Press <F9> to Auto Configure
Power-up Speed	Fast
BIOS Shadow	System in RAM Video in RAM
Disk Drive 0 Internal Floppy Disk or EFD No Floppy Disk Drive	 1.44 megabyte 3.5 in. Not installed
Disk Drive 1	Not installed
Fixed Disk 0 Type	As shown on the ID label
Fixed Disk 1 Type	None

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Chapter 4
NI-VXI Software Installation and Configuration

This chapter describes the NI-VXI software and contains instructions for installing and configuring the NI-VXI MS-DOS software. For instructions on installing the optional LabWindows VXI Library, refer to the *LabWindows VXI Library Reference Manual* (part number 320318-01). For instructions on installing and configuring the NI-488.2 software, refer to the *NI-488.2 MS-DOS Software Reference Manual*. For instructions on installing MS-DOS, refer to the Microsoft DOS kit. Because the VXIpc-386 built-in GPIB port is compatible with the industry-standard AT-GPIB plug-in GPIB interface board for PC AT computers, please refer to *Getting Started with Your AT-GPIB and the NI-488.2 MS-DOS Handler* for information about using the capabilities of the AT-GPIB in your system.

NI-VXI Software Overview

The following files make up the NI-VXI software.

Main Programs and Files

The main programs and files of the NI-VXI software package are found in the `C:\NIVXI` directory.

- `VXIINIT.EXE` is the VXIpc-386 initialization program. This program initializes the board interrupts, shared RAM, VXI register configurations, and bus configurations. `VXIINIT.EXE` can be included in the DOS batch file `AUTOEXEC.BAT` so that the VXIpc-386 is automatically initialized at startup. The configuration settings can be modified using the `VXIEDIT.EXE` program.

- `NIVXI.LIB` is the NI-VXI Large Memory Model function library for the Microsoft C Language interface.

- `RESMAN.EXE` is the National Instruments multimainframe Resource Manager.

- `VIC.EXE` is an interactive control program that executes functions you enter from the keyboard. It helps you learn the functions, program your VXI devices, and develop and debug your application programs.

- `VXIEDIT.EXE` is the VXI resource editor program. You can use this program to configure the system, edit the manufacturer name and ID numbers, and edit the model names of VXI and non-VXI devices in the system, as well as the system interrupt configuration information. This program also displays the system configuration information generated by the Resource Manager.

- `README.DOC` describes the various files on the NI-VXI distribution disks. This file also contains the latest updates and corrections to the manual when appropriate.

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Additional Programs and Files

The C:\NIVXI\TBL directory contains the following files:

- MFNAMEID.TBL is a file that contains the database of manufacturer names and their ID numbers.
- MODEL.TBL is a file that contains the database of model names, manufacturer names, and the model codes numbers.
- DEVICE.TBL is a file that contains the database of device names, manufacturer names, model names, and frame and slot associations for devices in the system.
- NONVXI.TBL is a file that contains the database for all non-VXI devices in the system.
- INTCFG.TBL is a file that contains the system interrupt configuration information.
- TRIGCFG.TBL is a file that contains the system trigger configuration information.
- UTILBUS.TBL is a file that contains the utility bus configuration information.
- VXIBUS.CFG is a file that contains the VXIpc-386 VXIbus configuration information.
- VXILA.CFG is a file that contains the VXIpc-386 logical address configuration information.
- VXIDEV.CFG is a file that contains the VXIpc-386 device-specific configuration information.

The C:\NIVXI\INCLUDE directory contains files for the Microsoft C and QuickBASIC language interfaces. The include files for the Microsoft C Language interface are as follows:

- NIVXI.H is the main header file containing the C prototypes for the NI-VXI functions.
- DATASIZE.H is a file that contains data size specifications.
- BUSACC.H is a file that contains parameter and return values for the bus access functions.
- DEVINFO.H is a file that contains parameter and return values for the device information and system configuration functions.
- VXIINT.H is a file that contains parameter and return values for the interrupt and signal functions.
- SYSINT.H is a file that contains parameter and return values for the system interrupt functions.
- TRIG.H is a file that contains parameter and return values for the trigger functions.
- WS.H is a file that contains parameter and return values for the Commander and Servant Word Serial functions.
- NIVXI.INC is the include file for the Microsoft QuickBASIC Language interface.

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The C:\NIVXI\QB directory contains the following object, library, and batch files to generate the Microsoft library for QuickBASIC:

- QBNIVXI.LIB is the file that contains the NI-VXI function library for the QuickBASIC interface.
- QBNIVXI.OBJ is the file that contains the NI-VXI symbols used to generate the QuickBASIC library for all versions.
- MKQLB*.BAT and MKQLB*.LNK are batch and response files used to generate a QuickBASIC library for the desired version.
- MKAPPBC.BAT and MKAPPBC.LNK are batch and response files that contain an example of how to build a BASIC application using NI-VXI functions.

Also included are the following files containing system functions used in the generation of QuickBASIC libraries for version 4.5 (default) and version 7.0 (7F and 7N):

- QB.OBJ
- QBMEM.OBJ
- QB1.LIB
- QB1_7F.LIB
- QB1_7N.LIB
- QB2.LIB

The C:\NIVXI\HLP directory contains various help files used by the VIC.EXE and VXIEDIT.EXE programs.

The C:\NIVXI\EXAMPLE directory contains various example programs that show how to use the NI-VXI software.

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Installing the Software

The VXIpc-386 is shipped with MS-DOS and the NI-VXI software installed on the hard disk. Unless you need to re-install part or all of the NI-VXI files, skip this section and continue with *Configuring the NI-VXI Software*, later in this chapter.

The NI-VXI distribution disks that came with your VXIpc-386 contain the NI-VXI files as well as an `INSTALL` program. The `INSTALL` program is provided to install a software update or to re-install software in the event that your files were accidentally erased. Follow these steps to re-install all or part of the NI-VXI software.

1. The NI-VXI software requires approximately 2 megabytes of free space on your hard disk. Create the necessary free space on the hard disk before starting the installation.

2. Run the `INSTALL` program on distribution disk 1. `INSTALL` is an interactive and self-guiding program, and will install all the necessary files on the hard disk and modify the `AUTOEXEC.BAT` file accordingly. The program prompts you to enter the following information:

   - Source drive: This is the floppy drive in which you inserted the the distribution disks.
   - Destination directory: This is the complete pathname of the directory where you want to install the software.
   - Boot drive: This information is used to find the `AUTOEXEC.BAT` file to modify it accordingly.

The `INSTALL` program has the following options:

`-a`: To install the entire distribution software (default)

`-1`: To install distribution disk 1 only

`-2`: To install distribution disk 2 only

`-m`: To modify the `AUTOEXEC.BAT` file only

You can use any combination of these options to meet your needs. The default, if no option is selected, is `-a` (to install the entire software). Use the DOS `COPY` command if you want to install selective files from the distribution disks.

You can quit the `INSTALL` program at any time. When you run the `INSTALL` program again, it will start over and re-copy all the necessary files.

The `INSTALL` program sets the environment variables `PATH`, `LIB`, `INCLUDE`, and `NIVXIPATH` in the `AUTOEXEC.BAT` file. In addition, `VXIINIT` is added in the `AUTOEXEC.BAT` file to be run by default at startup.

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Notice that the LIB environment variable is set to find the C Library NIVXI.LIB. You must change this variable in the AUTOEXEC.BAT file for QuickBASIC applications. For example, change the following sample line

from LIB=C:\NIVXI;C:\MC\LIB;

to LIB=C:\NIVXI\QB;C:\MC\LIB;

You can also put the line *RESMAN.EXE* in the AUTOEXEC.BAT file so that it runs automatically when the VXIpc-386 is started up. However, be sure to insert it after the line *VXIINIT.EXE*.

Configuring the NI-VXI Software

Run VXIINIT to initialize and display the VXIpc-386 configuration settings. The default configuration is Slot 0 System Controller, Resource Manager, Message-Based device. To change the current settings, or to view the configuration options, run VXIEDIT and select the Configuration Editor from the main menu.

You can use VXIEDIT to edit the description of the VXIpc-386 or any other device that is installed in the system. In this program, you can easily modify the configuration tables required for VXIbus and MXIbus operation. You can also use this program to configure interrupts, triggers, and the utility bus for single- or multiple-mainframe system configurations. For more details on how to use the VXIEDIT program, refer to the *NI-VXI DOS Utilities Reference Manual*.

Running VXIEDIT

You can use VXIEDIT, the VXI resource editor program, to configure the system and to edit the manufacturer name and ID numbers, the model names of VXI and non-VXI devices in the system, and the system interrupt configuration information. This program also displays the system configuration information generated by the Resource Manager.

To run VXIEDIT from any directory, make sure that the PATH environment variable has the destination directory of the NI-VXI software added to it. This program uses the different configuration files (*.CFG), table files (*.TBL), and help files (*.HLP) in its execution. Be sure that the environment variable NIVXIPATH is set to the destination directory of the NI-VXI software for proper execution. The default destination directory pathname used by the program is C:\NIVXI.

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Figure 4-1 shows the functions available under VXIEDIT.

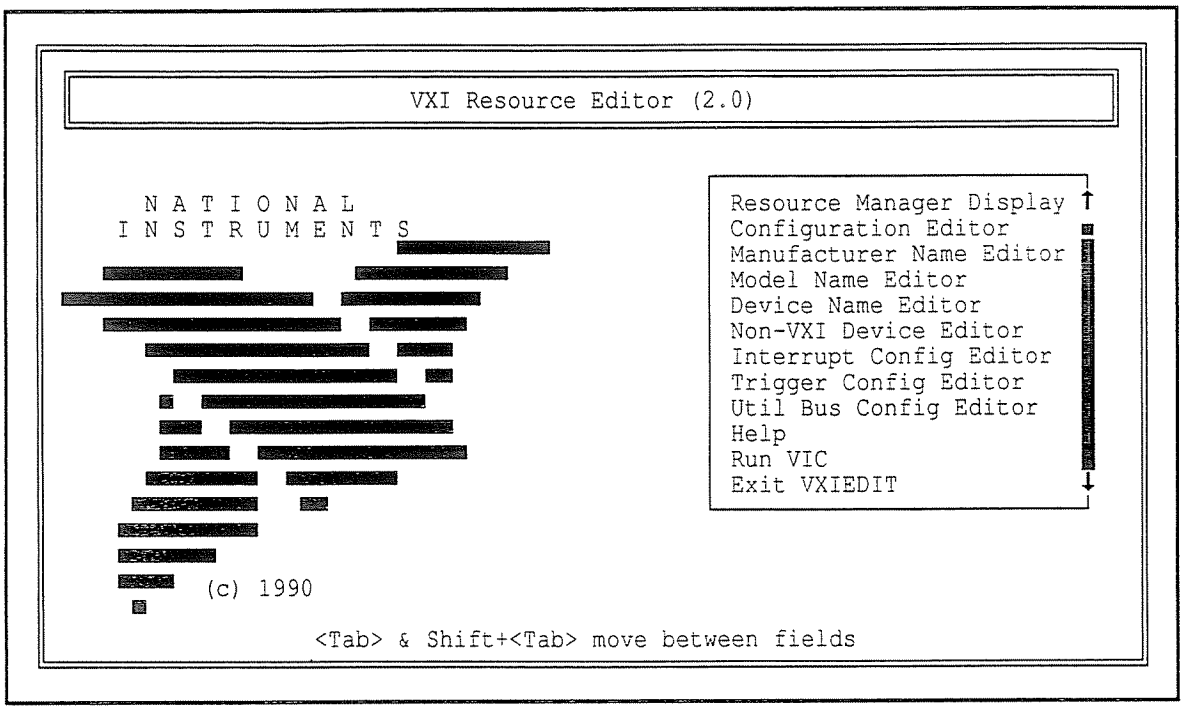


Figure 4-1. VXIEDIT Main Menu

When you select the Configuration Editor from the main menu, the Logical Address Configuration Editor menu (shown in Figure 4-2) is displayed. The following sections describe the various configuration options available under the Logical Address Configuration, Bus Configuration, and Device Configuration Editor menus.

Select *Next* and *Previous* to move between the three configuration editors. You can change the default settings to any value within the range shown to the right of each item by using the left and right arrow keys.

You can save your changes by selecting *Save*. Saving the changes updates files VXILA.CFG, VXIBUS.CFG, and VXIDEV.CFG. These files are used by VXIINIT.EXE to update the soft-configured settings, including board interrupts, shared RAM size, VXI register contents, and bus interface. You can exit the program at any time without saving any changes you have made by selecting *Abort*.

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Logical Address Configuration

The following paragraphs describe options available under the Logical Address Configuration Editor. Figure 4-2 shows the Logical Address Configuration Editor (VXIla) menu.

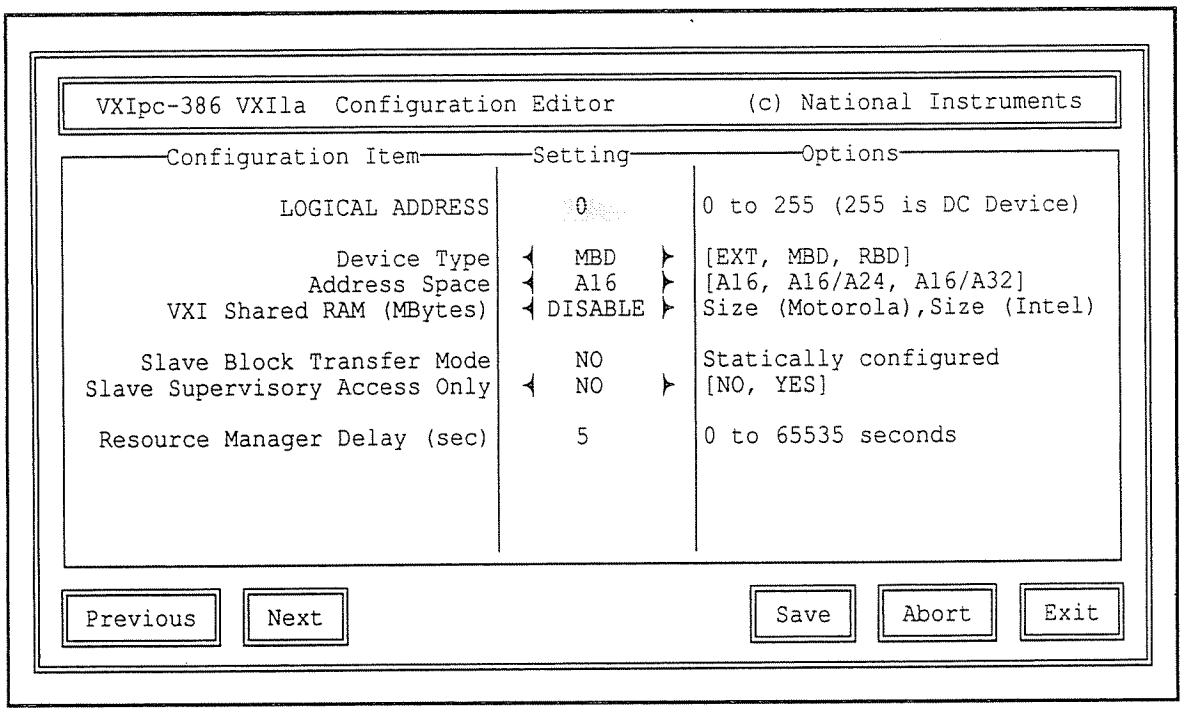


Figure 4-2. VXIpc-386 Logical Address Configuration Editor

Logical Address

The logical address is an 8-bit number that uniquely identifies the VXIpc-386. It can be configured as a static device with a logical address range from 0 through 254. Logical address 255 configures the VXIpc-386 as a Dynamic device, as specified in the *VXIbus System Specification*. The default logical address is 0.

Device Type

This field indicates the classification of the VXIbus device. The options are Extended Device (EXT), Message-Based Device (MBD), and Register-Based Device (RBD). The default is MBD.

The VXIpc-386 Device Type only affects the contents of the Device Class field in the Device Type register. The functionality of the other registers does not change.

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Address Space

This field indicates the addressing mode(s) of the device's operational registers. The VXIpc-386 can be configured as an A16 only, A16/A24, or A16/A32 device. The default is A16 only.

VXI Shared RAM

The VXIpc-386 local RAM can be slave-accessed in either A24 or A32 space in D08, D16, and D32 data transfer modes. The default byte ordering is Motorola (Big Endian) byte order. The bus interface accommodates automatic byte swapping as shown in Table 4-1.

Table 4-1. VXI Shared RAM Options

Address Space	Options	Description
A16	DISABLED	VXI Shared RAM disabled
A16/A24	(4 megabytes Motorola, 0 megabytes Intel)	Four megabytes of local RAM are shared in A24 space. Slave access to this RAM is in Motorola (Big Endian) byte order.
	(4 megabytes Motorola, 4 megabytes Intel)	In this option, 4 megabytes of local RAM are shared in A24 space, but 8 megabytes are requested. Accesses to the lower 4 megabytes access the local RAM in Motorola byte order. Accesses to the upper 4 megabytes of the 8 megabytes, however, access the same local RAM, but in Intel (Little Endian) byte order.
	(8 megabytes Motorola, 0 megabytes Intel)	Eight megabytes of local RAM are shared, and the slave access to this RAM is in Motorola byte order.
A16/A32	(8 megabytes Motorola, 8 megabytes Intel)	For address space selection of A16/A32, this is the only option. This option is similar to the 4 megabytes Motorola/4 megabytes Intel option for A24 space. Eight megabytes of local RAM are shared, but 16 megabytes are requested. Accesses to the lower half of the 16 megabytes access RAM in Motorola byte order, while accesses to the upper half access the same RAM in Intel byte order.

Slave Block Transfer Mode

The VXIpc-386 does not currently support block transfers in either slave-mode or master-mode accesses. This field is statically configured to NO, and cannot be changed.

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Slave Supervisory Access Only

When YES is selected, the VXIpc-386 will only acknowledge Supervisory accesses. Nonprivileged accesses will result in a bus error. This is true for all A16, A24, and A32 slave accesses. When NO is selected, the VXIpc-386 will acknowledge both supervisory and nonprivileged accesses. The default option is NO.

Resource Manager Delay

This field specifies the time in seconds that the Resource Manager (RM) waits before accessing any other VXIbus device's A16 configuration registers. The allowable range is from 0 to 65535 seconds. The default value is 5 seconds.

Bus Configuration

The following paragraphs describe options available under the Bus Configuration Editor. Figure 4-3 shows the VXIbus Configuration Editor (VXIbus) menu.

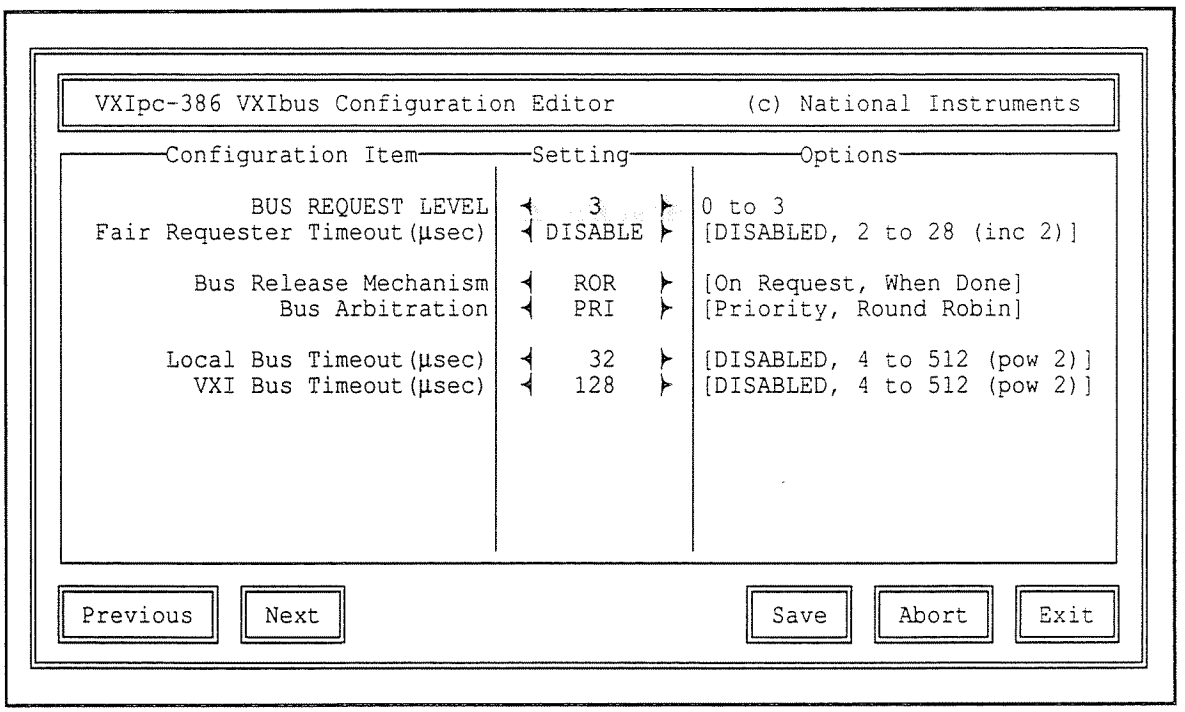


Figure 4-3. VXIpc-386 Bus Configuration Editor

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Bus Request Level

This field sets the VXIpc-386's VXIbus request level (BR0-3). The default value is level 3.

Fair Requester Timeout

The VXIpc-386 can be configured as a fair requester (Request on no request, or RONR) with a timeout period of 2 to 28 µsec (increments of 2), or can be configured as an unfair requester by selecting the field value of DISABLE. The default value is DISABLE for this field.

Bus Release Mechanism

This field sets the VXIbus release mechanism, which can be release on request (ROR) or release when done (RWD). The default value is ROR.

Bus Arbitration

The field sets the VXIbus arbitration mode. The two options are Priority (PRI) or Round Robin Select (RRS). The default value is PRI. The bus arbitration mode is relevant only when the VXIpc-386 is the Slot 0 device.

Local Bus Timeout

This field sets the timeout period for the VXIpc-386 local bus. You can set the timeout within the range from 4 to 512 µsec in powers of 2 (4, 8, 16, 32, 64, 128, 256, and 512), or you can disable this function. The default value is 32 µsec.

VXIbus Timeout

This field sets the timeout period for the VXIbus bus timeout (BTO) unit. When the VXIpc-386 is the System Controller, you can set the BTO period within the range from 4 to 512 µsec in powers of 2 (4, 8, 16, 32, 64, 128, 256, and 512). The default value is 128 µsec. When the VXIpc-386 is not the System Controller, the BTO unit is disabled.

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Device Configuration

The following paragraphs describe options available under the Device Configuration Editor. Figure 4-4 shows the Device Configuration Editor (VXIdev) menu.

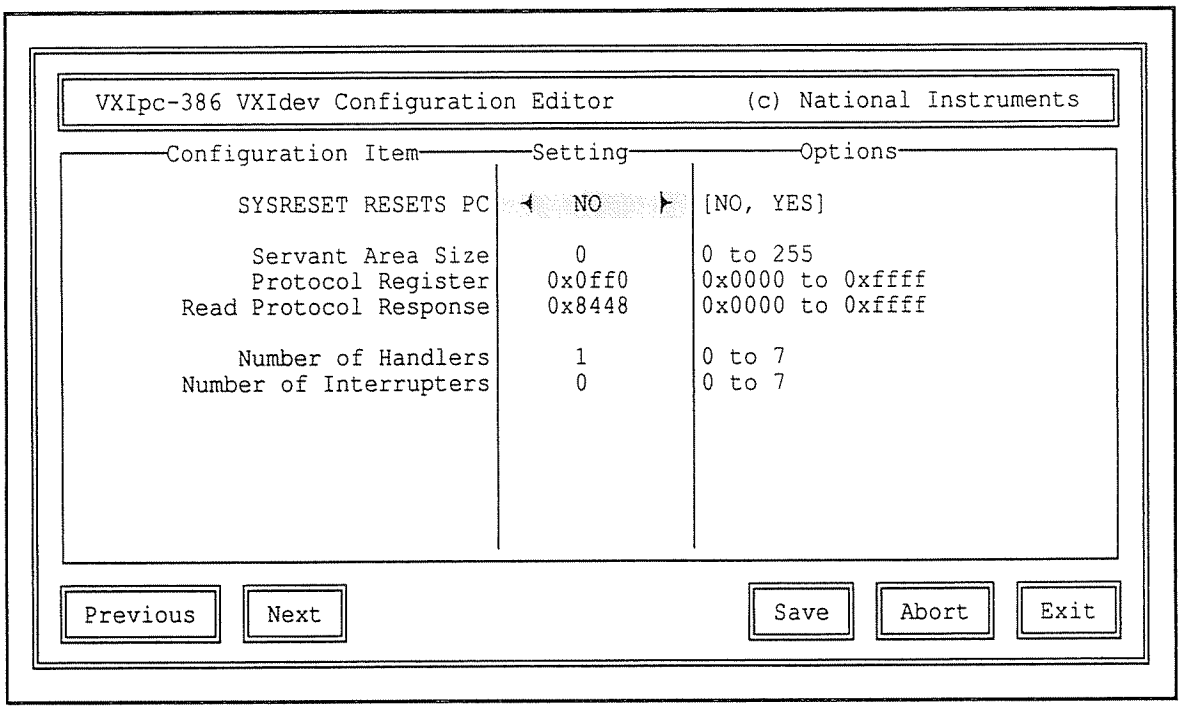


Figure 4-4. VXIpc-386 Device Configuration Editor

SYSRESET Action

When YES is selected, a SYSRESET on the backplane causes the VXIpc-386 to reboot. When NO is selected, a SYSRESET on the backplane does not reboot the VXIpc-386. However, all the hardware registers on the VXIpc-386 are reset, and the VXIpc-386 asserts SYSFAIL on the backplane. In this situation, you must run VXIINIT to re-initialize the hardware registers and to remove SYSFAIL. The default value for this field is NO.

Servant Area Size

This field designates the Servant Area size, which is supplied to the Resource Manager in response to the *Read Servant Area* command (if the VXIpc-386 is *not* the Resource Manager in your system). The Servant Area size is an 8-bit value (0 through 255) that indicates the VXIpc-386 Servant area. The Servant area begins at the logical address following the VXIpc-386 logical address, and includes *N* contiguous logical addresses, where *N* is the value of the Servant Area size. This field is meaningful only when the VXIpc-386 is configured as a Message-Based device. You can set the Servant Area size within the range 0 to 225. The default value is 0.

Note: If the VXIpc-386 *is* the Resource Manager, this setting is irrelevant.

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Protocol Register

This field specifies the contents of the Protocol register, indicating which protocols the VXIpc-386 supports. This field is meaningful only when the VXIpc-386 is configured as a Message-Based device. The default value is 0x0ff0 (Commander, Signal Register, Master).

Read Protocol Response

This field specifies the response value to a *Read Protocol* command received by the VXIpc-386 from the Resource Manager (if the VXIpc-386 is *not* the Resource Manager in your system). This field is meaningful only when the VXIpc-386 is configured as a Message-Based device. The default value is 0x8448 (Response Generation, Event Generation, Programmable Handler, Word Serial Trigger, Instrument, Extended Longword Serial, Longword Serial).

Number of Handlers

This field gives the number of interrupt handlers that the VXIpc-386 supports, which can range from 0 to 7. The default value is 1.

Number of Interrupters

This field gives the number of interrupters that the VXIpc-386 supports, which can range from 0 to 7. The default value is 0.

Exiting VXIEDIT and Re-initializing the Hardware

Select *Exit* or press the <Esc> key to quit the `VXIEDIT` program. If you changed any of the software configuration information, `VXIEDIT` prompts you to save your changes before exiting the configuration menu. Saving the configuration information updates the configuration files `VXILA.CFG`, `VXIBUS.CFG`, and `VXIDEV.CFG`. Run `VXIINIT.EXE` to re-initialize the hardware according to the new settings.

If you changed any of the software configuration settings from the default, record the new settings on the *VXIpc-386 Hardware and Software Configuration Form* in Appendix F.

Developing Your Application Program

The easiest way to learn how to communicate with your instruments is by controlling them interactively. Use the VXI interactive control program (`VIC.EXE`) to write to and read from your instruments. `VIC` displays the status of your VXI transactions and displays any errors that occur. Refer to the *NI-VXI DOS Utilities Reference Manual* on how to use `VIC` and to learn about its features.

`NIVXI.LIB` is the NI-VXI Large Memory Model function library for the Microsoft C Language interface. To use the NI-VXI software in your application program, include this library along with other libraries at link time. Make certain that the environment variables `LIB` and `INCLUDE` are set correctly as described in the *Installing the Software* section earlier in this chapter. The

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include files for the NI-VXI software are in the `INCLUDE` subdirectory. It is essential to include "`NIVXI.H`" before any other include file in your application program.

`QBNIVXI.LIB` is the file that contains the NI-VXI function library for the Microsoft QuickBASIC interface. This is used to generate `QBNIVXI.QLB`, the Microsoft QuickBASIC library. The corresponding include files `*.INC` are in the `INCLUDE` subdirectory in the distribution software.

The `EXAMPLE` subdirectory contains various example programs along with makefiles that show how to use various functions in the NI-VXI software and how to develop application programs using these functions.

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Appendix A
Front Panel Indicators

The VXIpc-386 has seven front panel LED indicators. The significance of each LED is determined by its color: red, green, or yellow. Red indicates a system failure, while green indicates an active state, and yellow indicates that a board resource is being accessed.

The red SYSFAIL LED is lit whenever the VMEbus signal SYSFAIL is asserted. The SYSFAIL LED does not indicate which VXIbus module is asserting the signal. It only indicates that one of the modules is driving SYSFAIL on the VXIbus backplane.

When the FAILED LED is lit, the VXIpc-386 is driving the SYSFAIL signal. The FAILED LED, together with the green TEST and ON LINE LEDs, indicate the status of the VXIpc-386. The status LED indications are shown in Table A-1. A successful system startup will sequence through the first six states. The point of failure is indicated for states where the FAILED LED is lit for an extended period of time.

Table A-1. Front Panel LED Indications

Sequence	FAILED	TEST	ON LINE	State	Point of Failure
1	OFF	OFF	OFF	No power	
2	ON	OFF	OFF	Booting DOS	Failed to boot DOS or waiting to run self-test/VXIINIT
3	ON	ON	OFF	In self-test/`VXIINIT`	Failed self-test/ `VXIINIT`
4	OFF	ON	OFF	Self-test passed, `VXIINIT` complete	
5	OFF	ON	ON	Performing Startup RM operations	
6	OFF	OFF	ON	Online, Startup RM operations complete	
	ON	ON	ON	Failed	Failed Startup RM
	ON	OFF	ON	Failed	Failed while online

The yellow ACCESS LED is lit when the VXIpc-386 MODID line is asserted or when the VXIbus registers or shared memory are accessed by another bus master.

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The yellow DRIVE LED is the hard disk drive access light. It is lit when the internal hard drive is in use.

The green TURBO LED indicates the processor operating speed. When lit, it indicates that the VXIpc-386 80386 processor is operating at its maximum frequency. When the TURBO LED is not lit, the processor is operating at a lower frequency (see Chapter 3, *BIOS Setup*).

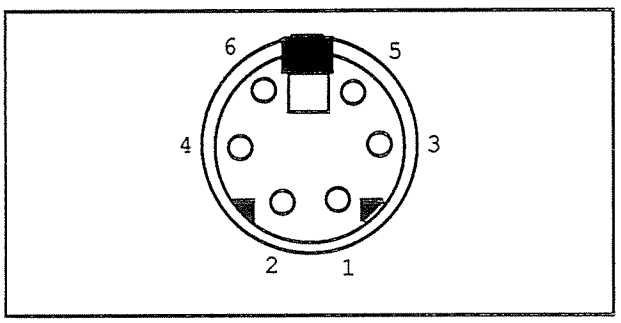
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Appendix B
Connectors

This appendix describes the connectors found on the VXIpc-386.

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

Keyboard Connector



Connector type: 6-pin Mini DIN

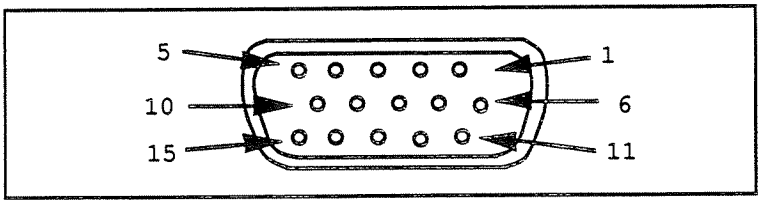
Figure B-1. KEYBOARD Connector

Table B-1. KEYBOARD Connector Signals

Pin	Signal Name	Signal Description
1	DATA	Data
2	n.c.	Not Connected
3	GND	Ground
4	+5V	+5 volts
5	CLK	Clock
6	n.c.	Not Connected

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VGA Connector



Connector type: 15-pin
Subminiature D
HD-22

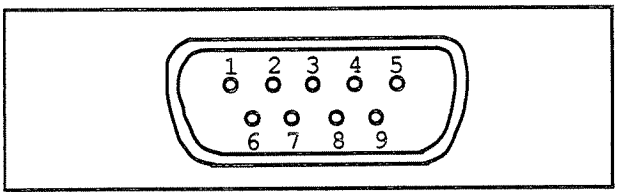
Figure B-2. VGA Connector

Table B-2. VGA Connector Signals

Pin	Signal Name	Signal Description
1	R	Red
2	G	Green
3	B	Blue
4	n.c.	Not Connected
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	n.c.	Not Connected
10	GND	Ground
11	n.c.	Not Connected
12	n.c.	Not Connected
13	HSync	Horizontal Sync
14	VSync	Vertical Sync
15	n.c.	Not Connected

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COM1 Connector



Connector type: 9-pin
Subminiature D
HD-20

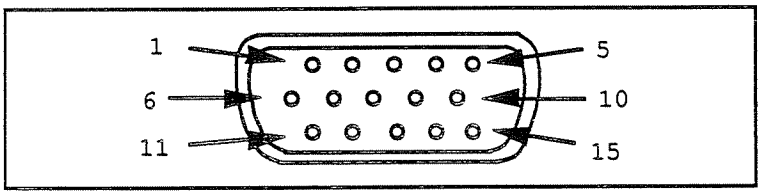
Figure B-3. COM1 Connector

Table B-3. COM1 Connector Signals

Pin	Signal Name	Signal Description
1	GND	Ground
2	TXD*	Transmit Data
3	RXD*	Receive 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	GND	Ground

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COM2/RGB Connector



Connector type: 15-pin
Subminiature D
HD-22

Figure B-4. COM2/RGB Connector

Table B-4a. COM2/RGB Connector COM2 Signals

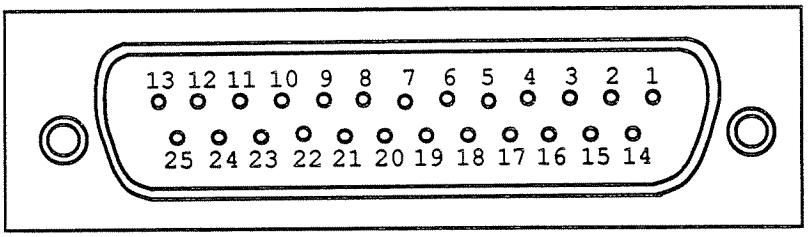
Pin	Signal Name	COM2 Signal Description
1	TXD*	Transmit Data
2	DSR*	Data Set Ready
3	RXD*	Receive Data
4	RTS*	Ready to Send
5	GND	Ground
6	CTS*	Clear to Send

Table B-4b. COM2/RGB Connector RGB Signals

Pin	Signal Name	RGB Signal Description
7	GND	Ground
8	SGREEN	Secondary Green
9	SRED	Secondary Red
10	SBLUE	Secondary Blue
11	PRED	Primary Red
12	HRTC	Horizontal Retrace
13	PGREEN	Primary Green
14	VRTC	Vertical Retrace
15	PBLUE	Primary Blue

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LPT Connector



Connector type: 25-pin
Subminiature D
HD-20

Figure B-5. LPT Connector

Table B-5. LPT Connector Signals

Pin	Signal Name	Signal Description
1	STROBE*	Data Strobe
2	D0	Data Bit 0
3	D1	Data Bit 1
4	D2	Data Bit 2
5	D3	Data Bit 3
6	D4	Data Bit 4
7	D5	Data Bit 5
8	D6	Data Bit 6
9	D7	Data Bit 7
10	ACK*	Acknowledge
11	BUSY*	Device Busy
12	PE	Paper End
13	SLCT	Select
14	AUTOFD*	Auto Linefeed
15	ERROR*	Error
16	INIT*	Initialize Printer

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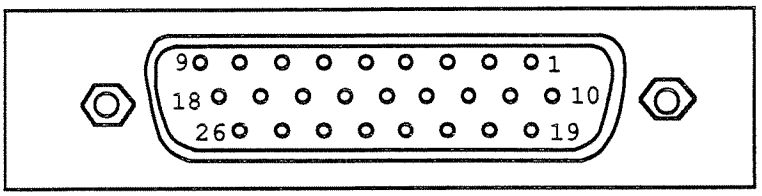
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Table B-5. LPT Connector Signals (continued)

Pin	Signal Name	Signal Description
17	SLCTIN*	Select Input
18	GND	Ground
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground
25	GND	Ground

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Floppy Disk Drive Connector



Connector type: 26-pin
Subminiature D
HD-22

Figure B-6. DISK DRIVE Connector

Table B-6. DISK DRIVE Connector Signals

Pin	Signal Name	Signal Description
1	+5V	+5 volts
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	FRWC*	Reduced Write Control
6	INDEX*	Index
7	MO1*	Motor on 1
8	GND	Ground
9	FDS2*	Drive Select 2
10	FDS1*	Drive Select 1
11	MO2*	Motor on 2
12	GND	Ground
13	FDIRC*	Direction Control
14	GND	Ground
15	FSTEP*	Step
16	GND	Ground
17	FWD*	Write Data

(continues)

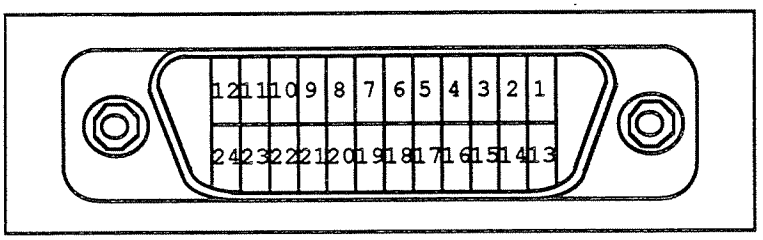
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Table B-6. DISK DRIVE Connector Signals (continued)

Pin	Signal Name	Signal Description
18	FWE*	Write Enable
19	FTK0*	Track 0
20	FWP*	Write Protect
21	GND*	Ground
22	FRDD*	Read Data
23	GND*	Ground
24	FHS*	Handshake
25	DCHG*	Diskette Change
26	GND*	Ground

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GPIB



Connector Type: GPIB

Figure B-7. GPIB Connector

Table B-7. GPIB Connector Signals

Pin	Signal Name	Signal Description
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

(continues)

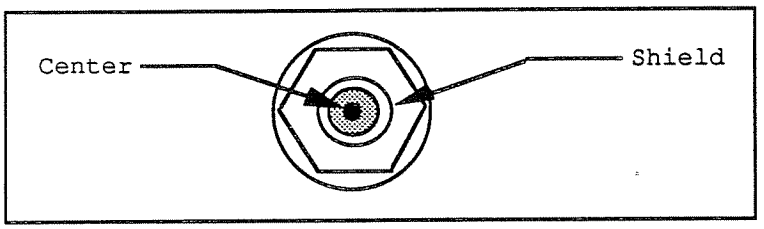
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Table B-7. GPIB Connector Signals (continued)

Pin	Signal Name	Signal Description
17	REN*	Remote Enable
18	GND	Logic Ground
19	GND	Logic Ground
20	GND	Logic Ground
21	GND	Logic Ground
22	GND	Logic Ground
23	GND	Logic Ground
24	GND	Logic Ground

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External CLK10 Connector



Connector Type: SMB

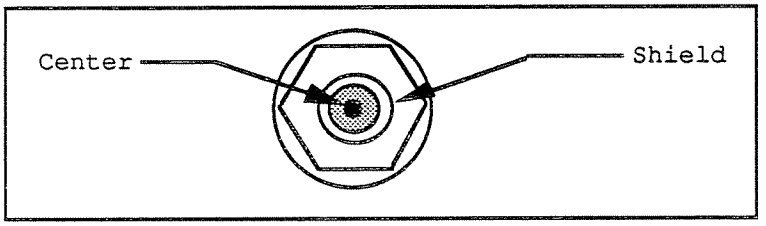
Figure B-8. EXT CLK Connector

Table B-8. EXT CLK Connector Signals

Pin	Signal Description
Center	TTL CLK10 I/O Signal
Shield	Ground

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External Trigger Input Connector



Connector Type: SMB

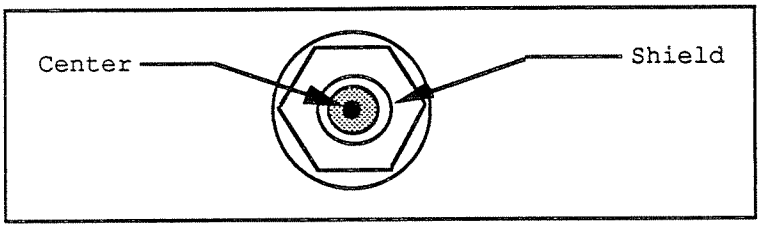
Figure B-9. TRG IN Connector

Table B-9. TRG IN Connector Signals

Pin	Signal Description
Center	Trigger Input Signal
Shield	Ground

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External Audio/Trigger Output Connector



Connector Type: SMB

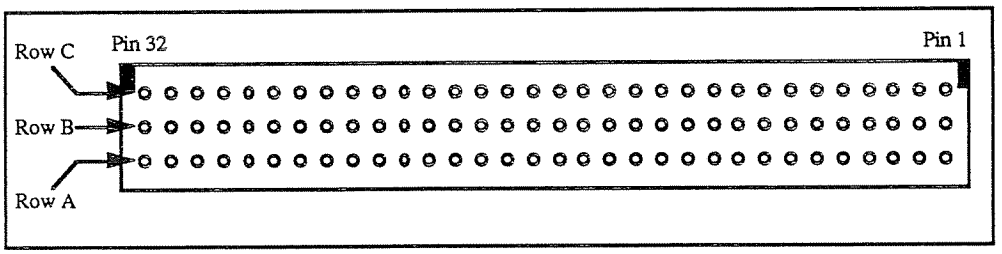
Figure B-10. AUDIO/TRG OUT Connector

Table B-10. AUDIO/TRG OUT Connector Signals

Pin	Signal Description
Center	Audio/Trigger Output Signal
Shield	Ground

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VXIbus Connectors



Connector Type:
96-pin DIN

Figure B-11. VXIbus P1 Connector

Table B-11. VXIbus P1 Connector Signals, Row A

Pin	Signal Name	Signal Description
1	D00	Data Bit 00
2	D01	Data Bit 01
3	D02	Data Bit 02
4	D03	Data Bit 03
5	D04	Data Bit 04
6	D05	Data Bit 05
7	D06	Data Bit 06
8	D07	Data Bit 07
9	GND	Ground
10	SYSCLK	System Clock
11	GND	Ground
12	DS1*	Data Strobe 1
13	DS0*	Data Strobe 0
14	WRITE*	Write
15	GND	Ground

(continues)

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Table B-11. VXIbus P1 Connector Signals, Row A (continued)

Pin	Signal Name	Signal Description
16	DTACK*	Data Transfer Acknowledge
17	GND	Ground
18	AS*	Address Strobe
19	GND	Ground
20	IACK*	Interrupt Acknowledge
21	IACKIN*	Interrupt Acknowledge In
22	IACKOUT*	Interrupt Acknowledge Out
23	AM4	Address Modifier 4
24	A07	Address Bit 07
25	A06	Address Bit 06
26	A05	Address Bit 05
27	A04	Address Bit 04
28	A03	Address Bit 03
29	A02	Address Bit 02
30	A01	Address Bit 01
31	-12V	-12 Volts DC
32	+5V	+5 Volts DC

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Table B-12. VXIbus P1 Connector Signals, Row B

Pin	Signal Name	Signal Description
1	BBSY*	Bus Busy
2	BCLR*	Bus Clear
3	ACFAIL*	AC Fail
4	BG0IN*	Bus Grant 0 In
5	BG0OUT*	Bus Grant 0 Out
6	BG1IN*	Bus Grant 1 In
7	BG1OUT*	Bus Grant 1 Out
8	BG2IN*	Bus Grant 2 In
9	BG2OUT*	Bus Grant 2 Out
10	BG3IN*	Bus Grant 3 In
11	BG3OUT*	Bus Grant 3 Out
12	BR0*	Bus Request 0
13	BR1*	Bus Request 1
14	BR2*	Bus Request 2
15	BR3*	Bus Request 3
16	AM0	Address Modifier 0

(continues)

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Table B-12. VXIbus P1 Connector Signals, Row B (continued)

Pin	Signal Name	Signal Description
17	AM1	Address Modifier 1
18	AM2	Address Modifier 2
19	AM3	Address Modifier 3
20	GND	Ground
21	n.c.	Not Connected
22	n.c.	Not Connected
23	GND	Ground
24	IRQ7*	Interrupt Request 7
25	IRQ6*	Interrupt Request 6
26	IRQ5*	Interrupt Request 5
27	IRQ4*	Interrupt Request 4
28	IRQ3*	Interrupt Request 3
29	IRQ2*	Interrupt Request 2
30	IRQ1*	Interrupt Request 1
31	n.c.	Not Connected
32	+5V	+5 Volts DC

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Table B-13. VXIbus P1 Connector Signals, Row C

Pin	Signal Name	Signal Description
1	D08	Data Bit 08
2	D09	Data Bit 09
3	D10	Data Bit 10
4	D11	Data Bit 11
5	D12	Data Bit 12
6	D13	Data Bit 13
7	D14	Data Bit 14
8	D15	Data Bit 15
9	GND	Ground
10	SYSFAIL*	System Fail
11	BERR*	Bus Error
12	SYSRESET*	System Reset
13	LWORD*	Long Word
14	AM5	Address Modifier 5
15	A23	Address Bit 23
16	A22	Address Bit 22

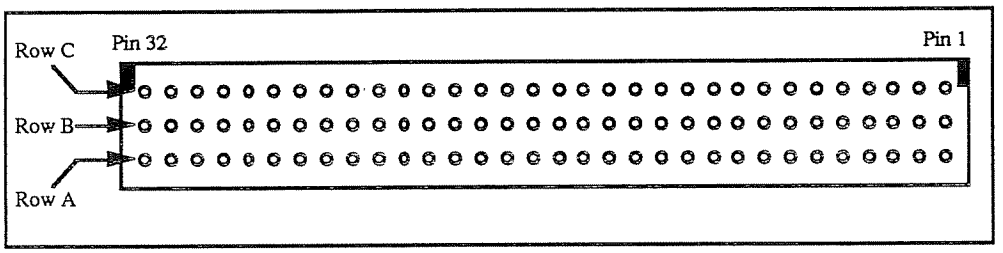
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Table B-13. VXIbus P1 Connector Signals, Row C (continued)

Pin	Signal Name	Signal Description
17	A21	Address Bit 21
18	A20	Address Bit 20
19	A19	Address Bit 19
20	A18	Address Bit 18
21	A17	Address Bit 17
22	A16	Address Bit 16
23	A15	Address Bit 15
24	A14	Address Bit 14
25	A13	Address Bit 13
26	A12	Address Bit 12
27	A11	Address Bit 11
28	A10	Address Bit 10
29	A09	Address Bit 09
30	A08	Address Bit 08
31	+12V	+12 Volts DC
32	+5V	+5 Volts DC

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Connector Type:
96-pin DIN

Figure B-12. VXIbus P2 Connector

Table B-14. VXIbus P2 Connector Signals, Row A

Pin	Signal Name	Signal Description
1	ECLTRG0	ECL Trigger 0
2	-2V	-2 Volts DC
3	ECLTRG1	ECL Trigger 1
4	GND	Ground
5	MODID12	Module ID 12
6	MODID11	Module ID 11
7	-5.2V	-5.2 Volts DC
8	MODID10	Module ID 10
9	MODID09	Module ID 09
10	GND	Ground
11	MODID08	Module ID 08
12	MODID07	Module ID 07
13	-5.2V	-5.2 Volts DC
14	MODID06	Module ID 06
15	MODID05	Module ID 05
16	GND	Ground

(continues)

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Table B-14. VXIbus P2 Connector Signals, Row A (continued)

Pin	Signal Name	Signal Description
17	MODID04	Module ID 04
18	MODID03	Module ID 03
19	-5.2V	-5.2 Volts DC
20	MODID02	Module ID 02
21	MODID01	Module ID 01
22	GND	Ground
23	TTLTRG0*	TTL Trigger 0
24	TTLTRG2*	TTL Trigger 2
25	+5V	+5 Volts DC
26	TTLTRG4*	TTL Trigger 4
27	TTLTRG6*	TTL Trigger 6
28	GND	Ground
29	n.c.	Not Connected
30	MODID00	Module ID 00
31	GND	Ground
32	n.c.	Not Connected

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Table B-15. VXIbus P2 Connector Signals, Row B

Pin	Signal Name	Signal Description
1	+5V	+5 Volts DC
2	GND	Ground
3	n.c.	Not Connected
4	A24	Address Bit 24
5	A25	Address Bit 25
6	A26	Address Bit 26
7	A27	Address Bit 27
8	A28	Address Bit 28
9	A29	Address Bit 29
10	A30	Address Bit 30
11	A31	Address Bit 31
12	GND	Ground
13	+5V	+5 Volts DC
14	D16	Data Bit 16
15	D17	Data Bit 17
16	D18	Data Bit 18

(continues)

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Table B-15. VXIbus P2 Connector Signals, Row B (continued)

Pin	Signal Name	Signal Description
17	D19	Data Bit 19
18	D20	Data Bit 20
19	D21	Data Bit 21
20	D22	Data Bit 22
21	D23	Data Bit 23
22	GND	Ground
23	D24	Data Bit 24
24	D25	Data Bit 25
25	D26	Data Bit 26
26	D27	Data Bit 27
27	D28	Data Bit 28
28	D29	Data Bit 29
29	D30	Data Bit 30
30	D31	Data Bit 31
31	GND	Ground
32	+5V	+5 Volts DC

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Table B-16. VXIbus P2 Connector Signals, Row C

Pin	Signal Name	Signal Description
1	CLK10+	10-MHz Clock +
2	CLK10-	10-MHz Clock -
3	GND	Ground
4	-5.2V	-5.2 Volts DC
5	n.c.	Not Connected
6	n.c.	Not Connected
7	GND	Ground
8	n.c.	Not Connected
9	n.c.	Not Connected
10	GND	Ground
11	n.c.	Not Connected
12	n.c.	Not Connected
13	-2V	-2 Volts DC
14	n.c.	Not Connected
15	n.c.	Not Connected
16	GND	Ground

(continues)

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Table B-16. VXIbus P2 Connector Signals, Row C (continued)

Pin	Signal Name	Signal Description
17	n.c.	Not Connected
18	n.c.	Not Connected
19	-5.2V	-5.2 Volts DC
20	n.c.	Not Connected
21	n.c.	Not Connected
22	GND	Ground
23	TTLTRG1*	TTL Trigger 1
24	TTLTRG3*	TTL Trigger 3
25	GND	Ground
26	TTLTRG5*	TTL Trigger 5
27	TTLTRG7*	TTL Trigger 7
28	GND	Ground
29	n.c.	Not Connected
30	GND	Ground
31	n.c.	Not Connected
32	n.c.	Not Connected

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Appendix C
Specifications

This appendix lists various module specifications of the VXIpc-386, such as physical dimensions and power requirements.

CPU

Microprocessor	20-MHz 80386
Numeric Coprocessor (optional)	20-MHz 80387
RAM	1, 2, 4, 5, or 8 megabytes
Hard Disk	40, 80, or 105 megabytes

Physical

C-size VXIbus Module

Slot Requirements	386/1: 1 slot 386/2: 2 slots
Local Bus Keying	Class 1, TTL

Front Panel Indicators

- SYSFAIL (red)
- FAILED (red)
- TEST (green)
- ON LINE (green)
- ACCESS (yellow)
- DRIVE (yellow)
- TURBO (green)

Front Panel Connectors

- VGA connector
- Keyboard connector
- COM1 connector
- COM2 connector
- LPT connector

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- External floppy disk (EFD) connector
- IEEE-488 connector
- CLK10 I/O connector
- Trigger Input connector
- Audio/Trigger Output connector

Power Requirements

Source	Direct Current (max)	Dynamic Current (max)
+5 VDC	4 A	Not Available
+12 VDC	40 mA	Not Available
-12 VDC	40 mA	Not Available
-5.2 VDC	700 mA	Not Available
-2 VDC	100 mA	Not Available

Cooling Requirements

Power Dissipation, max 35 W

Operating Environment

Temperature Refer to ID label

Relative Humidity 0% to 95% noncondensing

Storage Environment

Temperature Refer to ID label

Relative Humidity 0% to 100% noncondensing

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Functionality

IEEE-488

Capability Code	Description
SH1	Source Handshake
AH1	Acceptor Handshake
T5, TE5	Talker, Extended Talker
L3, LE3	Listener, Extended Listener
SR1	Service Request
PP1, PP2	Local/Remote Parallel Poll
C1, C2, C3, C4, C5	Controller
E1, E2	Tri-State Bus Drivers with Automatic Switch to Open Collector during Parallel Poll

VMEbus Master/Slave

- A16/A24/A32 Addressing
- D08(EO)/D16/D32 Data Paths
- Read-Modify-Write

VMEbus System Controller

- System Clock (SYSCLK) Driver
- System Reset (SYSRESET) Driver
- Priority or Round-Robin Arbiter
- Bus Timeout Driver

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VXIbus

- VXIbus System Specification Revision 1.3 Compatible
- Multimainframe Resource Manager (defeatable)
- Slot 0 Support (defeatable)
- Message-Based Commander and Servant
- Dynamically Configurable
- Programmable Interrupter (any combination of seven levels)
- Programmable Handler (any combination of seven levels)
- Trigger Source/Acceptor (SYNC, SEMI-SYNC, ASYNC, STST protocols)
- External Trigger I/O
- External CLK10 I/O

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Appendix D
Modifying and Installing I/O Expansion Boards

This appendix explains how to modify and install commercially available PC/XT and PC AT I/O boards in a VXIpc-386/2 equipped with the I/O expansion kit.

Some VXIpc-386/2 models are equipped with an expansion kit that accommodates installation of either two PC/XT-height boards, or one PC/XT- and one PC AT-height board. The optional ethernet adapter available from National Instruments (Option 920100-0x) is an example of a commercially available expansion board that has been modified for installation in a VXIpc-386.

When installing an I/O board you must use a panel bracket, as shown in the reference drawing located in the sleeve following this page, with the appropriate additional cutouts necessary to accommodate the connectors. The connector cutouts must fall within the shaded connector window shown in the drawing. The connector window is compatible with the VXIpc-386/2 front panel cutouts, as well as the connector window specified for 16-bit Industry Standard Architecture (ISA) bus I/O boards.

Note: In the drawing, all vertical dimensions are referenced to the bottom (connector) edge of the printed wiring board (PWB). Horizontal dimensions are referenced to the top (component) side of the PWB.

The panel should be manufactured according to the following specifications:

- Material: .030 ± .003 1010 Cold Rolled Steel
- Finish: Nickel Chrome

Alternatively, you can modify the blank panels provided with the VXIpc-386/2. Blank panels are also available from National Instruments as an accessory (P/N 181300-01). Custom panel design services are available from National Instruments for a nominal fee.

The two holes in the bracket align with existing holes in the VXIpc-386 front panel. To affix the panel bracket to the front panel, you can either install a PEM nut on the back (far) side of the bracket, or use a 4-40 nut with lock washer. In either case, use a 4-40 x 1/4 in. stainless steel panhead screw to mount the board/bracket assembly to the front panel. If you use a nut/lock washer, notice that the hole diameter should be 0.125 in. P/N 181300-01 is provided with PEM nuts installed.

To install your I/O board, replace the manufacturer-supplied panel bracket with the flat bracket. Seat it firmly in one of the expansion bus connectors, and affix it to the front panel with the two screws.

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Appendix E
VXIpc-386 Hardware Configuration

This appendix contains hardware configuration information about the VXIpc-386 regarding memory map locations, interrupt lines, and DMA channels.

Table E-1 shows the memory map locations used by the VXIpc-386 hardware windows to the VXIbus, and plug-in PC board expansion slots. Table E-2 lists the hardware interrupt lines used by the VXIpc-386, along with the corresponding functionality assigned to each line. Table E-3 lists the PC AT DMA channels used by the VXIpc-386, along with the corresponding functionality assigned to each channel.

When installing plug-in PC AT boards into a VXIpc-386 expansion slot, be careful to avoid conflicts with the VXIpc-386 hardware setting. All other VXIpc-386 motherboard I/O devices are mapped according to industry-standard PC AT conventions.

Table E-1. VXIpc-386 Memory Map

Start-End Address	Size	VXIbus Access
A000–BFFF	128 kilobytes	Super VGA
C8000–CFFFF	32 kilobytes	VXI A16 Space Window
D0000–DFFFF	64 kilobytes	For Plug-In PC Expansion Boards
E0000–EFFFF	64 kilobytes	VXI A24/A32 Space Window

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Table E-2. VXIpc-386 Interrupt Line Use

PC AT Interrupt Line Number	Functionality
0	System Timer
1	Keyboard
2	Cascade
3	COM2
4	COM1
5	Free for Plug-In PC Boards (Used if Option 920100-0x Installed)
6	Floppy Disk
7	Printer
8	Clock
9	VGA
10	Free for Plug-In PC Boards
11	GPIB
12	VXI (MIGA, VMEbus Interrupts, Triggers)
13	80387
14	Hard Drive
15	Free for Plug-In PC Boards

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Table E-3. VXIpc-386 DMA Channel Use

PC AT DMA Channel Number	Functionality
0	Free for Plug-In PC Boards
1	Free for Plug-In PC Boards
2	Floppy Disk Drive
3	Free for Plug-In PC Boards
4	Reserved
5	GPIB
6	Free for Plug-In PC Boards
7	Free for Plug-In PC Boards

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Appendix F
Customer Communication

We appreciate communicating with the people who use our products. We are also very interested in hearing about the applications you develop using our products. To make it easy for you to communicate with us, this appendix contains forms for you to complete. Completing the forms before contacting National Instruments will facilitate communication.

To preserve the forms in this manual, please photocopy them and complete the photocopied forms before contacting National Instruments.

Fax Technical Support

If you encounter any technical problems, you can contact us by fax at any time at the following number:

(512) 794-5678

Please complete the *Technical Support Fax Form* and the *VXIpc-386 Hardware and Software Configuration Form* before requesting technical support by fax.

Telephone Technical Support

You can use the following numbers between the hours of 8:00 a.m. and 5:30 p.m. (central time) to call the National Instruments applications engineering department:

(512) 794-0100
(800) 433-3488 (toll-free U.S. and Canada)

For fastest service, please complete the *VXIpc-386 Hardware and Software Configuration Form*, record any error messages, and be available at your computer when calling for technical support.

Documentation Comments

You can use the *Documentation Comment Form* for your comments about this document. Please mail it to the address printed at the bottom of the form.

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Technical Support Fax Form

Technical support is available at any time by fax at (512) 794-5678. For best results, provide as much information as possible.

Name _____

Company _____

Address _____

_____

Fax (___)_____ Phone (___)_____

The problem is _____

_____

_____

_____

_____

List any error messages _____

_____

_____

_____

_____

The following steps will reproduce the problem _____

_____

_____

_____

_____

Include the information from the *VXIpc-386 Hardware and Software Configuration Form.* Include additional pages if necessary.

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VXIpc-386 Hardware and Software Configuration Form

Record your hardware and software configuration as shown below. Complete this form each time you revise your software or hardware configuration, and use it 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-386 ID Label Information:
  - Part Number 181010 -_____ or 181480-_____
  - Serial Number _____
  - Revision Number _____
  - Fixed Disk Type (See ID label on module cover) _____
- VXIpc-386 Configuration Information (see Chapter 2):
  - Factory Configuration _____ yes _____ no

    If no, give the following information:

    VXIbus Slot/External CLK10 Configuration (Table 2-2):

    _____ A* _____ B _____ C _____ D _____ E _____ F
  - External Trigger Input Configuration (Figure 2-9):

    _____ Unterminated* _____ Terminated
  - External Audio/Trigger Output Configuration (Table 2-3):

    _____ Trigger Out* _____ Audio Out
- VXIpc-EFD External Floppy Drive:

  _____ Not Installed _____ Installed

  If installed, give the following information:

  Serial Number _____

  Revision _____

* Factory Configuration

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- Software Information (as shown on distribution diskettes):
  - MS-DOS Version: _____
  - NI-VXI MS-DOS for VXIpc-386 Version: _____
  - NI-488.2 MS-DOS Handler Version: _____
- NI-VXI Software Configuration Information (see Chapter 4):
  - VXIla Configuration
    - Logical Address: _____
    - Device Type: _____
    - Address Space: _____
    - VXI Shared RAM: _____
    - Slave Block Transfer Mode: _____
    - Slave Supervisory Access Only: _____
    - Resource Manager Delay (seconds): _____
  - VXIbus Configuration
    - Bus Request Level: _____
    - Fair Requester Timeout (µsec): _____
    - Bus Release Mechanism: _____
    - Bus Arbitration: _____
    - Local Bus Timeout (µsec): _____
    - VXIbus Timeout: _____
  - VXIdev Configuration
    - SYSRESET Resets PC: _____
    - Servant Area Size: _____
    - Protocol Register: _____
    - Read Protocols Response: _____
    - Number of Handlers: _____
    - Number of Interrupters: _____

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Other Products

- I/O Expansion Cards–VXIpc-386/2 only:
  (Manufacturer, Model) _____

  _____

- Monitor (Manufacturer, Model): _____
- Keyboard (Manufacturer, Model): _____
- Mouse (Manufacturer, Model): _____
- VXIbus Mainframe Manufacturer and Model: _____
- Other VXIbus Devices:

Manufacturer	Model	Function	Slot	Logical Address

Continue on a separate sheet, if necessary.

- Interrupt Level(s) of Other VXI Devices:
  (Handler/Interrupter) _____

  _____

  _____

  _____

- 488 bus Devices (Manufacturer, Model, GPIB Address): _____

  _____

  _____

  _____

  _____

  _____

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Documentation Comment Form

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Edition Date: **August 1991**

Part Number: **320291-01**

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

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