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Getting Started with Your Model 500 Series VXIpc-486™ and the NI-VXI™ Software for MS-DOS



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This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, may cause interference to radio and television reception. This equipment has been tested and found to comply with the following two regulatory agencies:

Federal Communications Commission

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules for a Class A digital device. Operation is subject to the following two conditions:

1. This device may not cause harmful interference in commercial environments.

2. This device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications

This device complies with the limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications (DOC).

Le présent appareil numérique n'émiet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le réglement sur le brouillage radioélectrique édicté par le ministére des communications du Canada.

Instructions to Users

These regulations are designed to provide reasonable protection against harmful interference from the equipment to radio reception in commercial areas. 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.

There is no guarantee that interference will not occur in a particular installation. However, the chances of interference are much less if the equipment is installed and used according to this instruction manual.

If the equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, one or more of the following suggestions may reduce or eliminate the problem.

- Operate the equipment and the receiver on different branches of your AC electrical system.
- Move the equipment away from the receiver with which it is interfering.
- Reorient or relocate the receiver's antenna.
- Be sure that the equipment is plugged into a grounded outlet and that the grounding has not been defeated with a cheater plug.

Notice 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.

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: *How to Identify and Resolve Radio-TV Interference Problems.* This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock Number 004-000-00345-4.

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About This Manual

This manual contains instructions for installing and configuring the National Instruments VXIpc-486 Model 500 Series embedded computer and the NI-VXI bus interface software for MS-DOS. The Model 500 Series consists of the Model 500 and Model 566 VXIpc-486 embedded computers.

Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, describes the Model 500 Series VXIpc-486 kit, contains a picture of the three types of VXIpc-486 modules, lists the contents of your kit, and lists optional equipment and software.
- Chapter 2, *VXIpc-486 Configuration and Installation*, describes how to configure and install the Model 500 Series VXIpc-486 embedded computer.
- Chapter 3, *BIOS Setup*, describes how to set up the Model 500 Series VXIpc-486 basic input/output system (BIOS).
- Chapter 4, *NI-VXI Software Installation and Configuration*, lists all the programs and files located on the NI-VXI distribution diskettes, contains instructions for installing the NI-VXI software, and describes how to use the `VXIEDIT` and `VXITEDIT` configuration editors to configure the NI-VXI software.
- Appendix A, *Specifications*, lists various module specifications of the Model 500 Series VXIpc-486, such as physical dimensions and power requirements.
- Appendix B, *Front Panel Indicators*, describes the function of the seven front panel LED indicators on the Model 500 Series VXIpc-486.
- Appendix C, *Connectors*, describes the Model 500 Series VXIpc-486 front panel and VXIbus connector pinouts.
- Appendix D, *Modifying and Installing I/O Expansion Boards*, explains how to modify and install commercially available PC/XT and PC AT I/O boards in a Model 500 Series VXIpc-486/2 or VXIpc-486/3 equipped with the I/O expansion kit.
- Appendix E, *VXIpc-486 Plug-in Boards*, discusses several considerations with regard to the height and length of plug-in boards used in an expansion kit for the VXIpc-486.
- Appendix F, *VXIpc-486 Hardware Configuration*, contains hardware configuration information about the Model 500 Series VXIpc-486 regarding memory map locations, I/O address map locations, interrupt lines, and DMA channels.

- Appendix G, *Configuring the Super VGA Option*, describes the Super VGA driver option you can use with your Model 500 Series VXIpc-486 and contains instructions for configuring your system to use this option.
- Appendix H, *Troubleshooting*, addresses certain problems you may encounter when using the NI-VXI bus interface software on the VXIpc-486 platform.
- Appendix I, *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 acronyms, abbreviations, metric prefixes, mnemonics, and symbols.

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.
bold italic	Bold italic text denotes a note, caution, or warning.
Model 500 Series	The term *Model 500 Series* is used in this manual to refer to both the Model 500 and the Model 566 VXIpc-486 embedded computers. When there are any differences between the two models, this manual describes them specifically.
<>	Angle brackets enclose the name of a key on the keyboard–for example, <Esc>.
-	A hyphen between two or more key names enclosed in angle brackets denotes that you should simultaneously press the named keys–for example, <Alt-Down Arrow>.
<Tab>	Key names are capitalized.

Abbreviations, acronyms, metric prefixes, mnemonics, symbols, and terms are listed in the *Glossary*.

How to Use This Documentation Set

Use this manual as a guide to installing and configuring the VXIpc-486, then use the interactive utilities described in the *NI-VXI DOS Utilities Reference Manual* and the *NI-VXI Text Utilities Reference Manual* to learn more about the capabilities of the NI-VXI software. Finally, use the *NI-VXI Software Reference Manual for C* or the *NI-VXI Software Reference Manual for BASIC* to develop your applications.

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

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
- VXI-1, *VXIbus System Specification*, Rev. 1.4, VXIbus Consortium, National Instruments part number 350083-01
- VXI-6, *VXIbus Mainframe Extender Specification*, Rev. 1.0, VXIbus Consortium, National Instruments part number 340258-01

Customer Communication

National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop using 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 I, *Customer Communication*, at the end of this manual.

Chapter 1
Introduction

This chapter describes the Model 500 Series VXIpc-486 kit, contains a picture of the three types of VXIpc-486 modules, lists the contents of your kit, and lists optional equipment and software.

The VXIpc-486 is an embedded computer based on the Industry Standard Architecture (ISA). The VXIpc-486 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-486 has an IEEE 488 interface compatible with the NI-488.2 architecture.

This manual describes the Model 500 and Model 566 versions of the VXIpc-486 as the Model 500 Series. The primary difference between the two models is that the Model 500 uses the 50 MHz version of the Intel 80486DX2 microprocessor while the Model 566 uses the 66 MHz version of the Intel 80486DX2 microprocessor.

The VXIpc-486/1 requires one VXIbus slot and contains an internal hard disk drive. An optional external floppy drive is available for transferring files between the VXIpc-486 and other PCs.

The VXIpc-486/2 and VXIpc-486/3 are 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-486/1 and VXIpc-486/2 models without an internal floppy drive.

Figure 1-1 shows the Model 500 Series in its one-slot, two-slot, and three-slot versions.

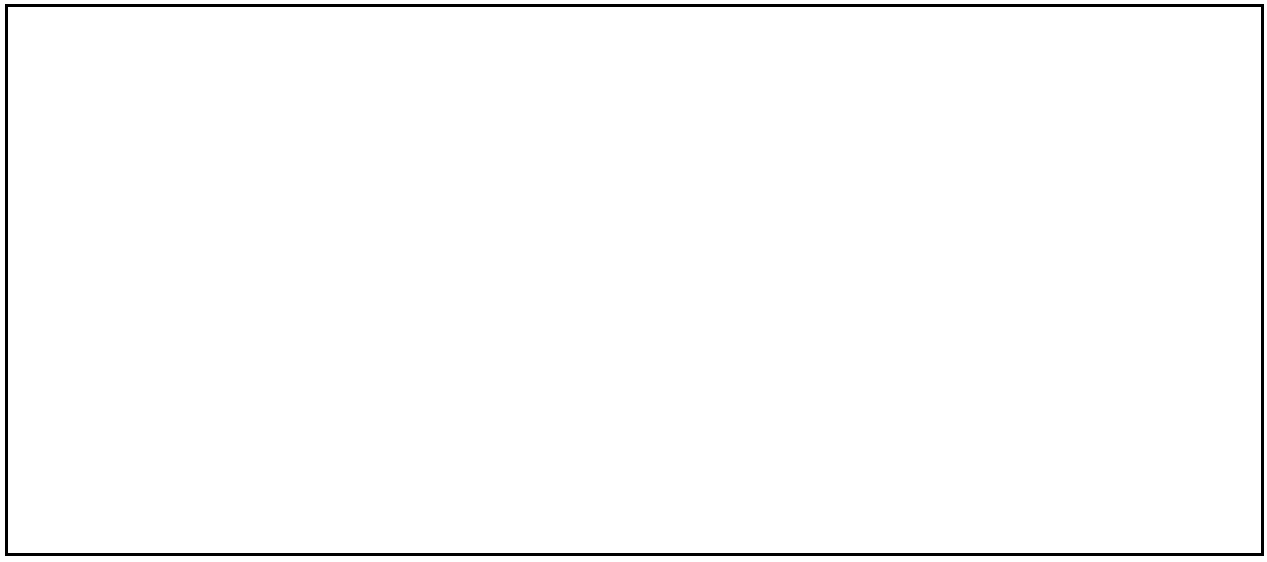


Figure 1-1. Model 500 Series VXIpc-486 Modules

What Your Kit Should Contain

Your kit should contain the following components:

Component	Part Number
Model 500 Series VXIpc-486 Module (one of the following)	
Model 500 one-slot (with onboard video)	182128-XYZ
Model 500 two-slot (with onboard video)	182129-XYZ
Model 500 two-slot (without onboard video)	182403-XYZ
Model 500 three-slot (with onboard video)	182132-XYZ
Model 566 one-slot (with onboard video)	182428-XYZ
Model 566 two-slot (with onboard video)	182429-XYZ
Model 566 two-slot (without onboard video)	182405-XYZ
Model 566 three-slot (with onboard video)	182432-XYZ
Keyboard Adapter Cable	181027-01
Microsoft DOS Kit	776376-11
NI-VXI Software Kit for the VXIpc-486 and MS-DOS	776459-31
NI-VXI Distribution Disks for the VXIpc-486 200/500 Series and MS-DOS	
Disk 1	422888-87
Disk 2	422889-87
Getting Started with Your Model 500 Series VXIpc-486 and the NI-VXI Software for MS-DOS	320522-01
NI-VXI DOS Utilities Reference Manual	320323-01
NI-VXI Software Reference Manual for BASIC	320328-01
NI-VXI Software Reference Manual for C	320307-01
NI-VXI Text Utilities Reference Manual	320321-01
NI-488.2 Software Kit for the VXIpc-486 and MS-DOS	776509-01
NI-488.2 Distribution Disk for the VXIpc and MS-DOS/Windows	422786-72
NI-488.2 Software Reference Manual for MS-DOS	320282-01
Getting Started with Your AT-GPIB and the NI-488.2 Software for MS-DOS	320284-01
VXIpc-486 Documentation Notice: AT-GPIB and MS-DOS Compatibility	320480-90
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.

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	182188-01
I/O Expansion Slot Panel Bracket, Blank	181300-01
Single-Shielded GPIB Cables: Type X1 Cable - 1 m Type X1 Cable – 2 m Type X1 Cable – 4 m	 763001-01 763001-02 763001-03
Double-Shielded GPIB Cables: Type X2 Cable - 1 m Type X2 Cable – 2 m Type X2 Cable – 4 m	 763061-01 763061-02 763061-03

Optional Software

You can order the Super VGA option for your Model 500 Series VXIpc-486. You can benefit from the improved graphic image from Super VGA if you want to edit or view an especially complex image in graphics or CAD programs. If you ordered your VXIpc-486 with Super VGA already installed, you must modify the system settings as described in Appendix G, *Configuring the Super VGA Option*. This appendix also includes installation instructions in case you order this option at a later date.

Component	Part Number
Super VGA Video Option	920005-02

If you want to use LabWindows with your VXIpc-486 system, you can order either the LabWindows for DOS, VXI Development System, or the LabWindows/CVI for Windows, VXI Development System. If you want LabWindows/CVI, you must also order NI-VXI Windows Software for the VXIpc-486 Model 566 and 500 Series. The following table lists the subcomponents of the two kits.

Software	Part Number
LabWindows for DOS, VXI Development System: LabWindows for DOS Full Develoment System, LabWindows for DOS VXI Libraries, LabWindows for DOS VXI Instrument Library	776729-21
LabWindows/CVI for Windows, VXI Development System: LabWindows/CVI for Windows Full Develoment System, LabWindows/CVI for Windows VXI Libraries, LabWindows/CVI for Windows VXI Instrument Library	776804-21
NI-VXI Windows Software for VXIpc-486 Model 566 and 500 Series (required for LabWindows/CVI only)	776530-21

If you want to use LabVIEW with your VXIpc-486 system, you must order NI-VXI Windows Software for the Model 500 Series VXIpc-486 and the LabVIEW for Windows VXI Development System. The following table lists the subcomponents of the kit.

Software	Part Number
LabVIEW for Windows VXI Development System: LabVIEW for Windows Full Development System, LabVIEW for Windows VXI Library, LabVIEW for Windows/Sun VXI Instrument Library	776674-21
NI-VXI Windows Software for VXIpc-486 Model 566 and 500 Series	776530-21

Chapter 2
VXIpc-486 Configuration and Installation

This chapter describes how to configure and install the Model 500 Series VXIpc-486 embedded computer. Your VXIpc-486 is shipped with software already installed on the hard disk. Refer to Chapter 4, *NI-VXI Software Installation and Configuration* should you need to reinstall any of the software. Because the VXIpc-486 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 Software for MS-DOS* (part number 320284-01) for information about using the capabilities of the AT-GPIB in your system.

Note: ***This chapter discusses the VXIpc-486 Models 500 and 566 together as the Model 500 Series. Any differences between the two models are described specifically. Because the two models look the same, illustrations in this chapter apply equally to either model.***

Factory Configuration

The Model 500 Series VXIpc-486 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. Model 500 Series VXIpc-486 Factory Configuration

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

You can alter the VXIpc-486 factory configuration, 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-486

This section describes how to modify the Model 500 Series VXIpc-486 factory configuration.

Unless you have special system configuration requirements, you can install and use the VXIpc-486 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-486*, later in this chapter.

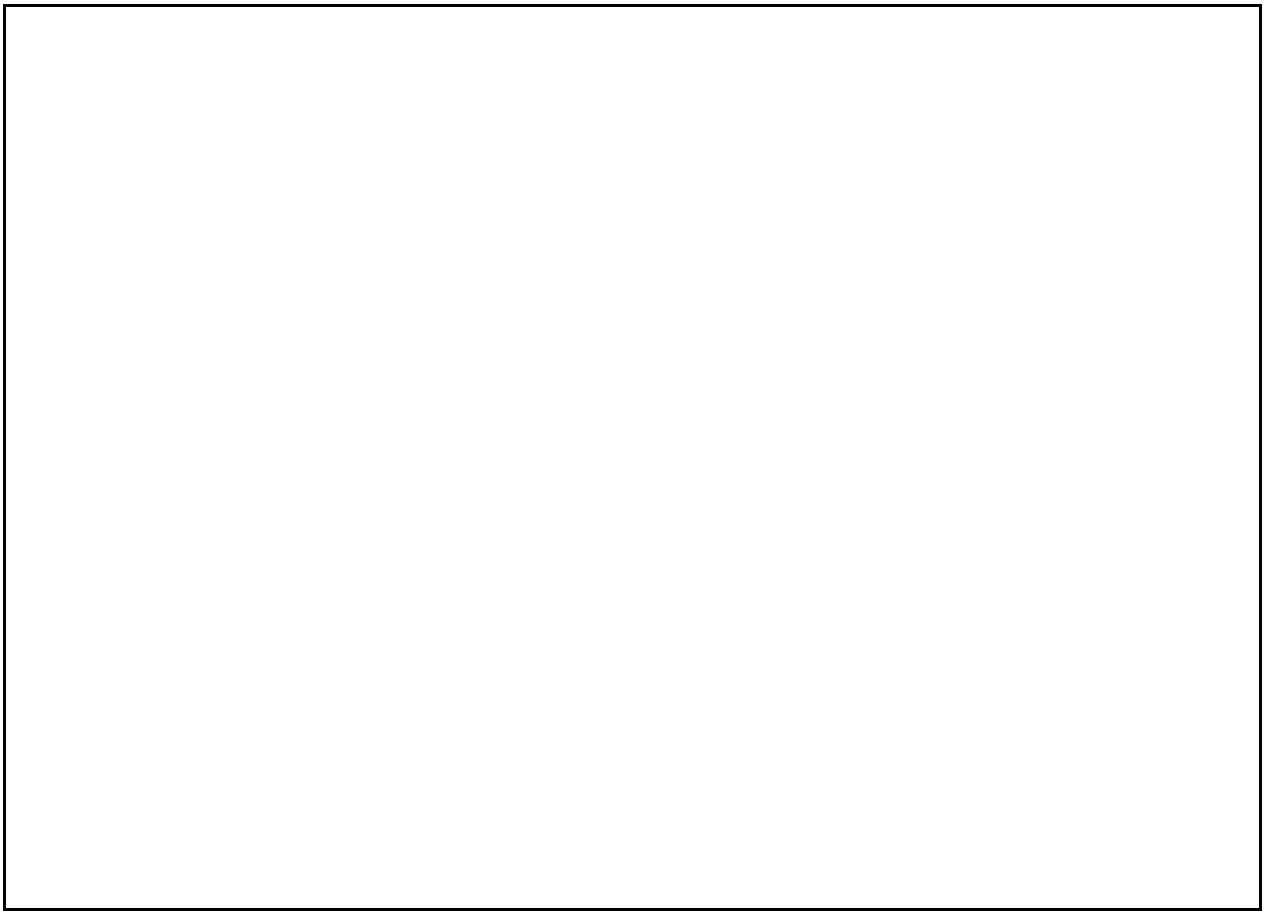


Figure 2-1. Model 500 Series VXIpc-486 Parts Locator Diagram (Continues)

Configuration Procedure

Follow these steps to modify the factory configuration:

1. Ground yourself and the VXIpc-486. The VXIpc-486 can be damaged by static discharge. You are less likely to damage the VXIpc-486 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 board.

3. Alter the configuration as required, as described in the following section.

4. Replace the cover and the screws.

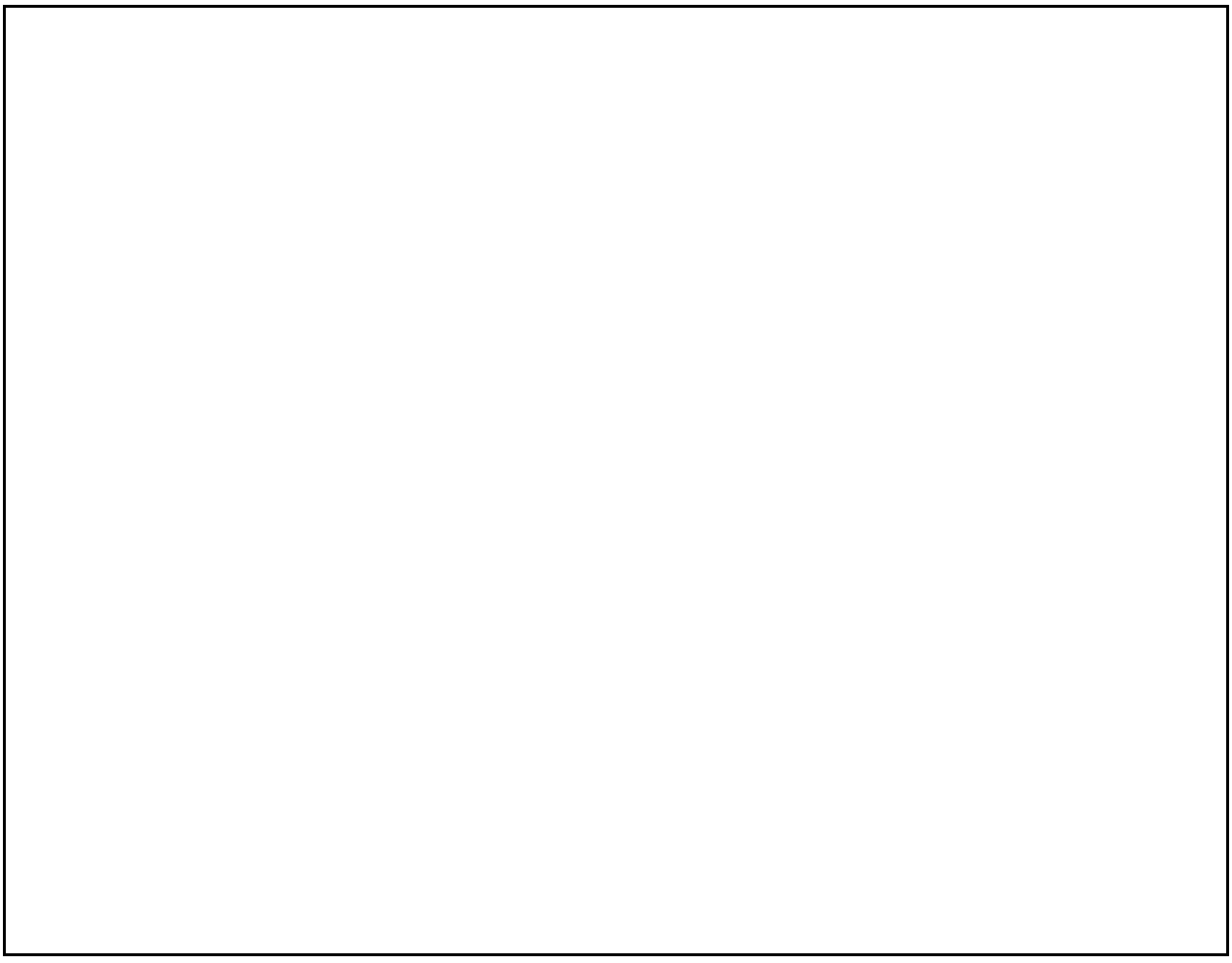


Figure 2-1. Model 500 Series VXIpc-486 Parts Locator Diagram (Continued)

Configuration Options

Figure 2-1 shows the location of the Model 500 Series VXIpc-486 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 W25 and W21. You may change the position of these jumpers as required, but do not remove them completely.

VXIbus Slot and External CLK10 Configuration Options

Because the VXIbus slot and external CLK10 configuration options are interdependent, they are discussed together in this section.

The external CLK10 interface is the SMB connector labeled *CLK* on the VXIpc-486 front panel. The external CLK10 signal is a TTL-level signal.

Table 2-2 presents six different configuration options of the slot position and external CLK10, including the factory default settings. Refer to the applicable configuration figures (Figures 2-2 through 2-7) that illustrate how to set up these options.

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

Configuration	VXIbus Slot	External CLK10	Applicable Configuration Figures					
			W26	W25	W24	W32, W33, W35, W36	W20	J16
A*	Slot 0	Disabled	2-2a	2-3a	2-4a	2-5a	2-6a	2-7a
B	Slot 0	Output	2-2a	2-3a	2-4a	2-5a	2-6b	2-7a
C	Slot 0	Input, Unterminated	2-2a	2-3a	2-4b	2-5a	2-6c	2-7a
D	Slot 0	Input, 50 Ω Terminated	2-2a	2-3a	2-4b	2-5a	2-6c	2-7b
E	Non-Slot 0	Disabled	2-2b	2-3b	2-4a	2-5b	2-6a	2-7a
F	Non-Slot 0	Output	2-2b	2-3b	2-4a	2-5b	2-6b	2-7a
* Factory Configuration								

Configurations A through D are Slot 0 settings. Do not install the VXIpc-486 in any other slot if you are using any of these four configuration options.

Warning: ***Installing a VXIpc-486 configured for Slot 0 operation into any slot other than Slot 0 can damage the VXIpc-486, the backplane, and the Slot 0 device.***

- Configuration A is the factory default mode of the Model 500 Series VXIpc-486. Use this mode when the VXIpc-486 is the Slot 0 device and does *not* need to use the external CLK10 SMB connector on the front panel to receive or send the CLK10 signal. In this configuration, the onboard CLK10 reference (derived from an oscillator) source drives the differential ECL CLK10 backplane signals, and the CLK10 is disabled. Use configurations B, C, or D if the VXIpc-486 is the Slot 0 device and *does* need to use the external CLK10 connector.

- Configuration B is similar to A, except that the CLK10 SMB is driven with a TTL level CLK10 derived from the ECL CLK10 driven on the backplane.

- In configuration C, the CLK10 SMB can be connected to a TTL CLK10 source to generate the ECL CLK10 on the backplane.

- Configuration D is similar to C, except that the external CLK10 reference is terminated with a 50 Ω resistor to ground.

The four Slot 0 settings are useful in multiple-mainframe configurations. For example, to synchronize multiple mainframes together, you can use a VXIpc-486 as the clock source and configure it to configuration B. Configure other Slot 0 controllers in other mainframes to configuration C and connect the CLK10 SMBs together. The frames now have synchronized CLK10 signals, which can be used in conjunction with the external trigger lines to synchronize devices in multiple mainframes.

If you will be installing the Model 500 Series VXIpc-486 in any slot other than Slot 0, use either configuration E or F. As a Non-Slot 0 device, the VXIpc-486 accepts the CLK10 signal from the backplane.

- In configuration E, the Model 500 Series VXIpc-486 accepts the CLK10 signal from the backplane, and terminates the differential ECL CLK10 signals with 50 Ω resistors to -2V.

- Configuration F is similar to E, except that the VXIpc-486 also drives the external CLK10 connector with a TTL CLK10 reference signal.

Depending on the hardware changes you make to your VXIpc-486, you will need to make some corresponding changes to the software by running one of the VXI resource editor configuration programs. Refer to Chapter 4, *NI-VXI Software Installation and Configuration*, for instructions on using either the `VXIEDIT` or `VXITEDIT` program. These programs are described in greater detail in the *NI-VXI DOS Utilities Reference Manual* and the *NI-VXI Text Utilities Reference Manual*, respectively.

For example, when you configure the VXIpc-486 as a Non-Slot 0 device, you need to use the Bus Configuration Editor to change both the **Local Bus Timeout** and **VXI Bus Timeout** values to `DISABLED`. (The default values are 32 µs for the **Local Bus Timeout** and 128 µs for the **VXI Bus Timeout** because the VXIpc-486 is factory configured to be a Slot 0 device.)

Additionally, if you do not want the VXIpc-486 to be the system Resource Manager, use the Logical Address Configuration Editor to change the **Logical Address** field to a non-zero, unused logical address. (The default logical address of the VXIpc-486 is 0.)

W26 configures the MODID signal termination for Slot 0/Non-Slot 0 operation. When configured for Slot 0 operation (Figure 2-2a), W26 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), W26 causes the MODID signal to be terminated with a 825 Ω pull-down resistor.

Figure 2-2 shows the possible settings for W26.

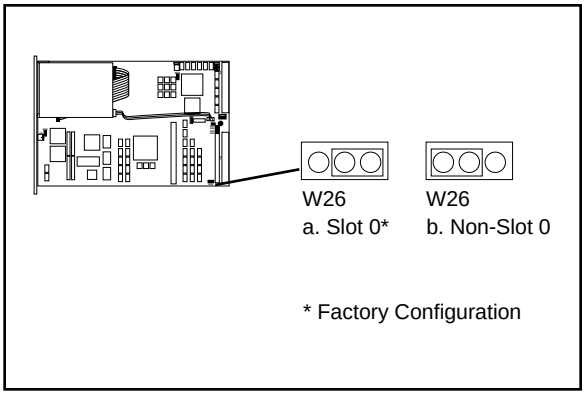


Figure 2-2. MODID Signal Termination Settings

W25 configures the System Controller for Slot 0/Non-Slot 0 operation. When configured for Slot 0 operation (Figure 2-3a), W25 enables the Model 500 Series VXIpc-486 System Controller functions (SYSCLK and SYSRESET drivers, the Bus Arbiter and Bus Timer). When configured for Non-Slot 0 operation (Figure 2-3b), W25 disables the System Controller functions.

Figure 2-3 shows the possible settings for W25.

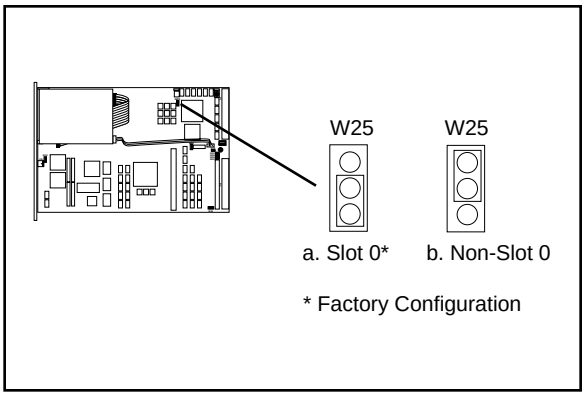


Figure 2-3. System Controller Settings

W24 configures the receiving source for the CLK10 reference. For internal clock generation, set the jumper as shown in Figure 2-4a. When the source is from the CLK10 input on the front panel of the VXIpc-486, set the jumper as shown in Figure 2-4b. Notice that when configured for Non-Slot 0, CLK10 will always be received from the backplane.

Figure 2-4 shows the possible settings for W24.

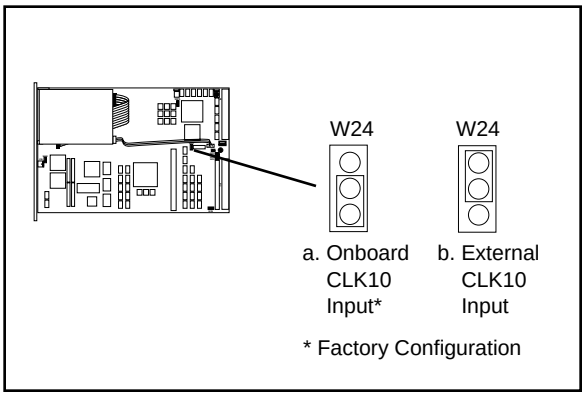


Figure 2-4. CLK10 Generation Settings

Figure 2-5 shows the allowed settings for W32, W33, W35, and W36. Figure 2-6 shows the possible settings for W20. Figure 2-7 shows the possible settings for J16.

Warning: ***Do not set the W32, W33, W35, W36 jumper block to any setting other than those shown in Figure 2-5. Any other settings could result in damage to the VXIpc-486 and any other devices installed on the backplane.***

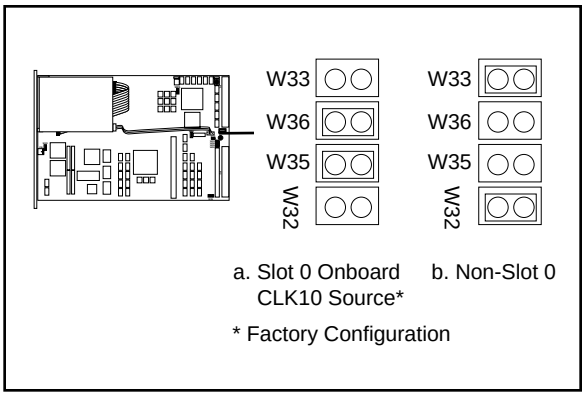


Figure 2-5. VXIbus CLK10 Settings

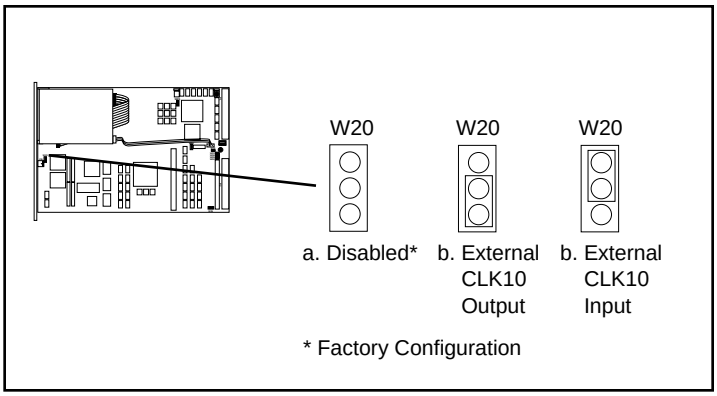


Figure 2-6. External CLK10 Settings

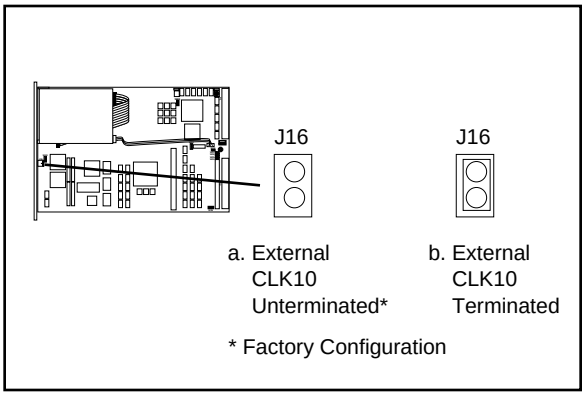


Figure 2-7. External CLK10 Termination Settings

External Trigger Input Configuration

The external TTL trigger input interface is the SMB connector labeled *TRG IN* on the VXIpc-486 front panel. Figure 2-8 shows the external trigger input circuit.

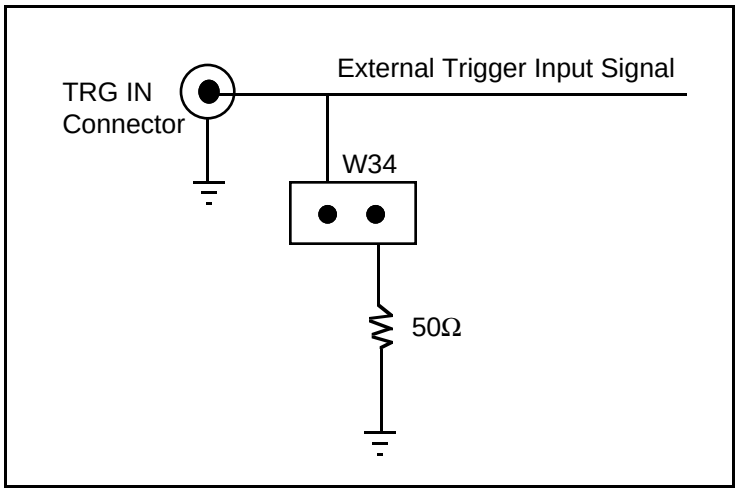


Figure 2-8. External Trigger Input Circuit

Optionally, you can terminate the external TTL trigger input with a 50 Ω resistor to ground. Figure 2-9 shows the external trigger input termination settings.

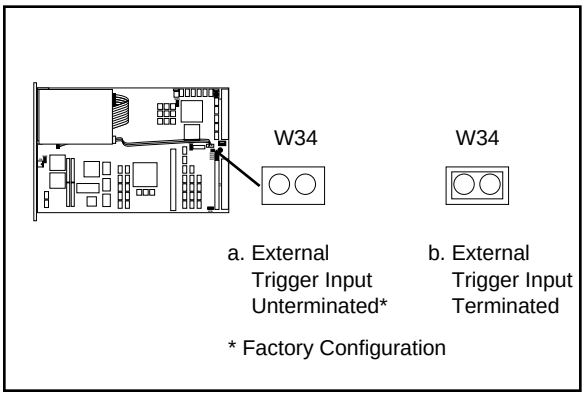


Figure 2-9. External Trigger Input Termination Settings

External Audio/Trigger Output Configuration

The external audio/trigger output interface is the SMB connector labeled *AUDIO/TRG OUT* on the VXIpc-486 front panel.

You can configure the external audio/trigger output 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. You can configure the audio/trigger output by connecting the cable to either J13 or J17. Table 2-3 shows the configuration options.

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. You can change the amount of installed RAM on Model 500 Series VXIpc-486/1 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.

Warning: ***Do not attempt to change the factory RAM configuration of VXIpc-486/2 or VXIpc-486/3 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 MB	256 KB x 36	Not Installed
2 MB	256 KB x 36	256 KB x 36
4 MB	1 MB x 36	Not Installed
5 MB	1 MB x 36	256 KB x 36
8 MB	1 MB x 36	1 MB x 36
16 MB	4 MB x 36	Not Installed
32 MB	4 MB x 36	4 MB x 36

National Instruments recommends the following DRAM SIMMs for use with the VXIpc-486/1:

- Hitachi part number HB56G25636B-7AL or equivalent 256 KB x 36 SIMMs
- Toshiba part number THM361020ASG-70 or equivalent 1 MB x 36 SIMMs
- Toshiba part number THM364020SG-70 or equivalent 4 MB x 36 SIMMs.

Note: ***Always reconfigure the Model 500 Series VXIpc-486/1 to the factory DRAM configuration shown on the ID label before returning it to the factory for repairs or upgrades.***

Installing and Starting Up the VXIpc-486

The following installation instructions apply to the Model 500 Series VXIpc-486. Refer to your mainframe user manual for further instructions regarding mainframe configuration and module installation. Figure 2-10 shows the location of the VXIpc-486 front panel connectors. Refer to Appendix C, *Connectors*, for pinout details about each connector.

1. Turn off the mainframe power.

   Warning: ***Installing a Model 500 Series VXIpc-486 configured for Slot 0 operation into any slot other than Slot 0 can result in damage to the VXIpc-486, the backplane, and the Slot 0 device.***

2. If the VXIpc-486 is configured for Slot 0 operation, install it in Slot 0. If the VXIpc-486 is configured as a Non-Slot 0 device, install it in any slot other than Slot 0. The *VXIbus Slot and External CLK10 Configuration Options* section, earlier in this chapter, describes the different configuration options for Slot 0 and non-Slot 0 applications. Refer also 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 that you received with your kit to adapt AT-style keyboards to the VXIpc-486 mini-DIN connector.

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

6. On VXIpc-486 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-486, turn on the mainframe power. Also apply power to any peripherals, such as the monitor. The basic input/output system (BIOS) boot sequence should now begin to display startup messages on the monitor. Chapter 3, *BIOS Setup*, contains information on BIOS that you may need in case you either have special BIOS configuration requirements or you encounter a BIOS-related error message.

The front panel LED indicators also provide information about the VXIpc-486 and VXIbus system status. The SYSFAIL and FAILED LEDs remain lit until the VXIpc-486 initialization program `VXIINIT.EXE` is run. See Chapter 4, *NI-VXI Software Installation and Configuration*, for more information about `VXIINIT`. See Appendix B, *Front Panel Indicators*, for more information about the front panel LED operation.

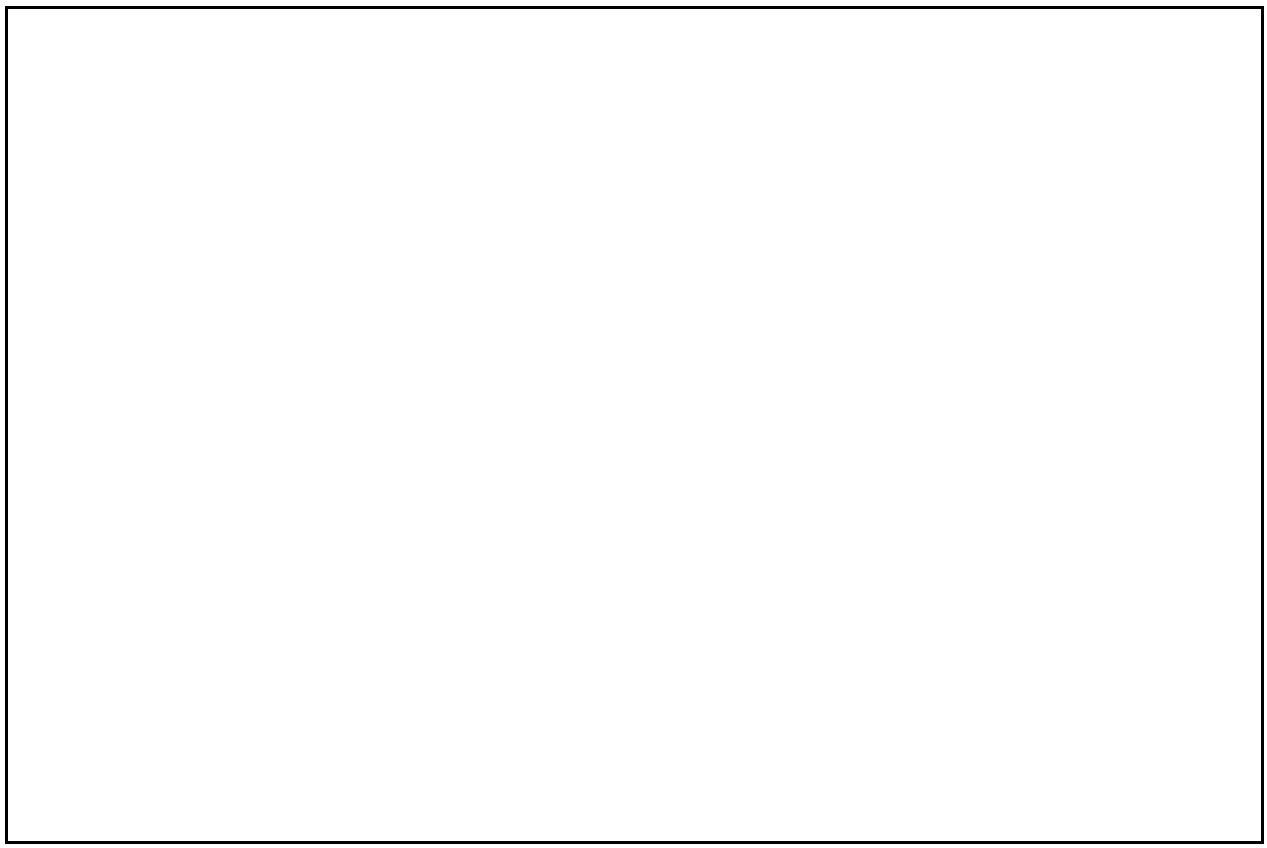


Figure 2-10. Model 500 Series VXIpc-486 Front Panel

Chapter 3
BIOS Setup

This chapter describes how to set up the Model 500 Series VXIpc-486 basic input/output system (BIOS). The VXIpc-486 uses the Quadtel AT Compatible Enhanced BIOS. The BIOS defines the way in which software interacts with the Model 500 Series VXIpc-486 hardware. The BIOS has a number of setup parameters that contain the VXIpc-486 system configuration information.

The BIOS setup parameters are stored in the CMOS RAM, which is backed up by battery. 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.*

Running Setup

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 <F2> after power-on 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. Press <F10> to save the configuration parameters you edited.

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-486 will restart.

Table 3-1 shows the default BIOS configuration parameters.

Table 3-1. Default BIOS Setup 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	Normal
BIOS Shadow	System in RAM Video in RAM
Disk Drive 0 Internal Floppy Disk or EFD No Floppy Disk Drive	 1.44 MB 3.5 in. Not installed
Disk Drive 1	Not installed
Fixed Disk 0 Type	As shown on the ID label <AUTO>
Fixed Disk 1 Type	None

Extended Features

The Quadtel BIOS contains some extended features. You can access and modify these features by following these steps.

1. Press <F2> after power-on to display the Extended BIOS Software main window.
2. Use the Up/Down Arrow keys to select the appropriate feature and press <Enter>.
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. Press <F10> to save the configuration parameters you edited.
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-486 will restart.

Table 3-2 shows the default BIOS configuration parameters for the extended features.

Table 3-2. Extended BIOS Configuration Parameters

Parameter (Extended)	Configuration
Auto Park Disk	No
Quick Boot	No
Screen Saver	Disabled
Keyboard Click	No
Keyboard Delay	1/2 sec
Keyboard Rate	13/sec
Numlock Boot State	Auto

Chapter 4
NI-VXI Software Installation and Configuration

This chapter lists all the programs and files located on the NI-VXI distribution diskettes, contains the instructions for installing the NI-VXI software, and describes how to use the VXIEDIT and VXITEDIT configuration editors to configure the NI-VXI software. Your VXIpc-486 is shipped from the factory with MS-DOS, NI-VXI, and NI-488.2 software already installed on the hard disk. The information on installing the NI-VXI software is included in this chapter should you ever need to reinstall it. 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 Software Reference Manual for MS-DOS.* For instructions on installing MS-DOS, refer to the Microsoft DOS kit. Because the VXIpc-486 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 Software for MS-DOS* 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-486 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-486 is automatically initialized at startup. The configuration settings can be modified using the VXIEDIT.EXE program.

- RESMAN.EXE is the National Instruments multimainframe Resource Manager. RESMAN.EXE may be executed only after VXIINIT.EXE has been run.

- 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. This program is described in detail in the *NI-VXI DOS Utilities Reference Manual.*

- VICTEXT.EXE is a text-based interactive control program that is functionally equivalent to VIC.EXE. This program is described in detail in the *NI-VXI Text Utilities Reference Manual.*

- 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. This program is described in detail in the *NI-VXI DOS Utilities Reference Manual.*

- VXITEDIT.EXE is the text-based VXI resource editor program that is functionally equivalent to VXIEDIT.EXE. This program is described in detail in the *NI-VXI Text Utilities Reference Manual.*

- README.DOC contains the latest updates and corrections to the manual when appropriate.

Additional Programs and Files

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

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

- MFNAMEID.TBL contains the database of manufacturer names and their ID numbers.

- MODEL.TBL contains the database of model names, manufacturer names, and the model codes numbers.

- DEVICE.TBL contains the database of device names, manufacturer names, model names, and frame and slot associations for devices in the system.

- NONVXI.TBL contains the database for all non-VXI devices in the system.

- INTCFG.TBL contains the system interrupt configuration information.

- TRIGCFG.TBL contains the system trigger configuration information.

- UTILBUS.TBL contains the utility bus configuration information.

- CREG.TBL contains device-dependent information to be written to the control register by the Resource Manager.

- REGS.TBL contains the register names of VXI devices.

- WSCMDS.TBL contains the VXI Word Serial command values.

- VXIBUS.CFG contains the VXIpc-486 VXIbus configuration information.

- VXILA.CFG contains the VXIpc-486 logical address configuration information.

- VXIDEV.CFG contains the VXIpc-486 device-specific configuration information.

- VXIMF.CFG contains information specific to the board manufacturer.
- DVXI.CFG contains information for internal use by the driver.

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

- NIVXI.H is the main header file containing the C prototypes for the NI-VXI functions.
- DATASIZE.H contains data size specifications.
- BUSACC.H contains parameter and return values for the bus access functions.
- DEVINFO.H contains parameter and return values for the device information and system configuration functions.
- VXIINT.H contains parameter and return values for the interrupt and signal functions.
- SYSINT.H contains parameter and return values for the system interrupt functions.
- TRIG.H contains parameter and return values for the trigger functions.
- WS.H 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.

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

- RESMAND.EXE is used by RESMAN in the DOS environment. RESMAN calls this file directly.
- VICD.EXE is used by VIC in the DOS environment. VIC calls this file directly.
- VICTEXTD.EXE is used by VICTEXT in the DOS environment. VICTEXT calls this file directly.
- VXIEDITD.EXE is a file used by VXIEDIT in the DOS environment. VXIEDIT calls this file directly.
- VXITEDID.EXE is a file used by VXITEDIT in the DOS environment. VXITEDIT calls this file directly.

The C:\NIVXI\DOS directory contains up to three subdirectories.

The C:\NIVXI\DOS\BORLANDC subdirectory is installed if you choose to install both the DOS environment and the Borland C libraries. It contains the following file and subdirectory:

- NIVXIDOS.LIB is the NI-VXI Large Memory Model function library for the Borland C Language interface.

- The C:\NIVXI\DOS\BORLANDC\EXAMPLES subdirectory contains various example programs that show how to use the NI-VXI software with Borland C.

The C:\NIVXI\DOS\MSC subdirectory is installed if you choose to install both the DOS environment and the Microsoft C libraries. It contains the following file and subdirectory:

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

- The C:\NIVXI\DOS\MSC\EXAMPLES subdirectory contains various example programs that show how to use the NI-VXI software with Microsoft C.

The C:\NIVXI\DOS\QB subdirectory 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
- B1_71F.LIB
- B1_71N.LIB
- B2_71.LIB

Installing the Software

The VXIpc-486 is shipped with MS-DOS and the NI-VXI software installed on the hard disk. Unless you need to reinstall 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-486 contain the NI-VXI files as well as an INSTALL program. The INSTALL program is used to install a software update or to reinstall software in the event that your files were accidentally erased. Follow these steps to reinstall all or part of the NI-VXI software.

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

2. Run INSTALL.EXE on distribution disk 1. INSTALL is a text-based, interactive, self-guiding program, which will install all the necessary files (for a complete or partial installation, as user-specified) on the hard disk. In addition, it will optionally modify the AUTOEXEC.BAT initialization file accordingly. The program prompts you to enter the following information:

   - Whether to install NI-VXI for DOS: If you need to add only a certain component (for example, QuickBASIC) but already have the NI-VXI package installed, you can respond *No*. The default is to install the DOS applications.

   - Languages to install: You can choose whether to install the Microsoft C, Borland C, and/or QuickBASIC libraries. The default is to install all of them, but if you are using only one compiler, you can select only that compiler. However, if you do install both C libraries, you must let INSTALL know which one to make the default library.

   - Source drive: This is the floppy drive in which you inserted the distribution disks.

   - Destination directory: This is the complete pathname of the directory where you want to install the software.

   - Modifying DOS initialization files: You can choose whether INSTALL modifies the AUTOEXEC.BAT file to reflect the location of the NI-VXI library. If you choose to let INSTALL do this, you must also enter the drive where AUTOEXEC.BAT can be found.

   You can quit the INSTALL program at any time by choosing *Exit* from the initial screen, or by pressing <Control-C> once installation has begun. INSTALL will prompt you to be certain you really want to quit at that time. If you choose to run the INSTALL program again, it starts over and recopies all the necessary files. Of course, if you made any changes from the default configuration, you will need to specify those changes once again.

   As mentioned previously, INSTALL *optionally* modifies the AUTOEXEC.BAT file. If you *do* modify it, INSTALL changes the old file's extension to .BAK and keeps it for safety purposes. If you do *not* modify it, INSTALL creates a file in the NI-VXI directory with the changes it proposes you make to the file, and names it AUTOEXEC.VXI.

Modifying the AUTOEXEC.BAT File

If you choose to let INSTALL modify your AUTOEXEC.BAT file, it updates the setting of environment variables PATH, LIB, and INCLUDE to specify the relevant subdirectories of the NI-VXI directory. The previously specified directories in PATH, LIB, and INCLUDE remain unchanged. INSTALL also adds a new environment variable NIVXIPATH, and appends a command line to execute VXIINIT.EXE automatically.

If you choose not to let INSTALL modify your AUTOEXEC.BAT file, refer to the AUTOEXEC.VXI file in your NI-VXI directory for suggestions on how to change the following lines manually.

- The PATH variable should include the full path to the subdirectory where the NI-VXI utilities are located, in addition to whatever other directories you have already specified in PATH. Normally, these files reside in the root of the NI-VXI directory.
- The LIB variable should include the full path to the subdirectories that contain the C libraries for the compiler you choose to install.
- The INCLUDE variable should include the full path to the subdirectory that contains the NI-VXI include files. By default, the include files reside in the INCLUDE subdirectory of the NI-VXI directory.
- The NIVXIPATH variable should contain the full path to the NI-VXI directory.

Note: ***Once the NI-VXI package is installed, run VXIINIT.EXE and then RESMAN.EXE.***

Configuring the NI-VXI Software

Run VXIINIT to initialize and display the VXIpc-486 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 or VXITEDIT and select the Configuration Editor from the main menu.

You can use VXIEDIT or VXITEDIT to edit the description of the VXIpc-486 or any other device that is installed in the system. You can easily modify the configuration tables required for VXIbus and MXIbus operation. You can also configure interrupts, triggers, and the utility bus for single- or multiple-mainframe system configurations. You may find the VXIEDIT program easier to use because of its structure, which uses a series of interactive graphical screens to display information for the various editors. You can use VXITEDIT to accomplish the same tasks by entering commands at the keyboard.

For more details on how to use the VXIEDIT program, refer to the *NI-VXI DOS Utilities Reference Manual*. For more details on how to use the VXITEDIT program, refer to the *NI-VXI Text Utilities Reference Manual.*

Running VXIEDIT

se the VXI resource editor program, VXIEDIT, 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 both the PATH and NIVXIPATH environment variables have the destination directory of the NI-VXI software added to it. PATH is used to find the application itself, while NIVXIPATH is used by the different configuration files (*.CFG), table files (*.TBL), and help files (*.HLP) during its execution. The default pathname used by the program if NIVXIPATH is not set is C:\NIVXI.

Figure 4-1 shows the functions available under VXIEDIT.

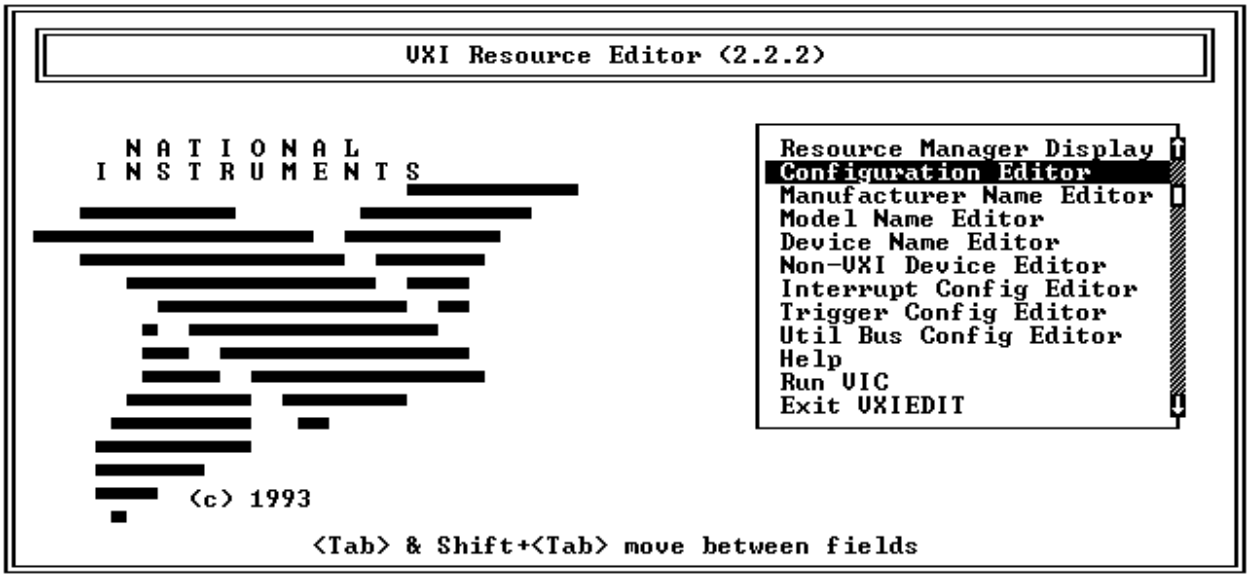


Figure 4-1. VXIEDIT Main Menu

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*.

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.

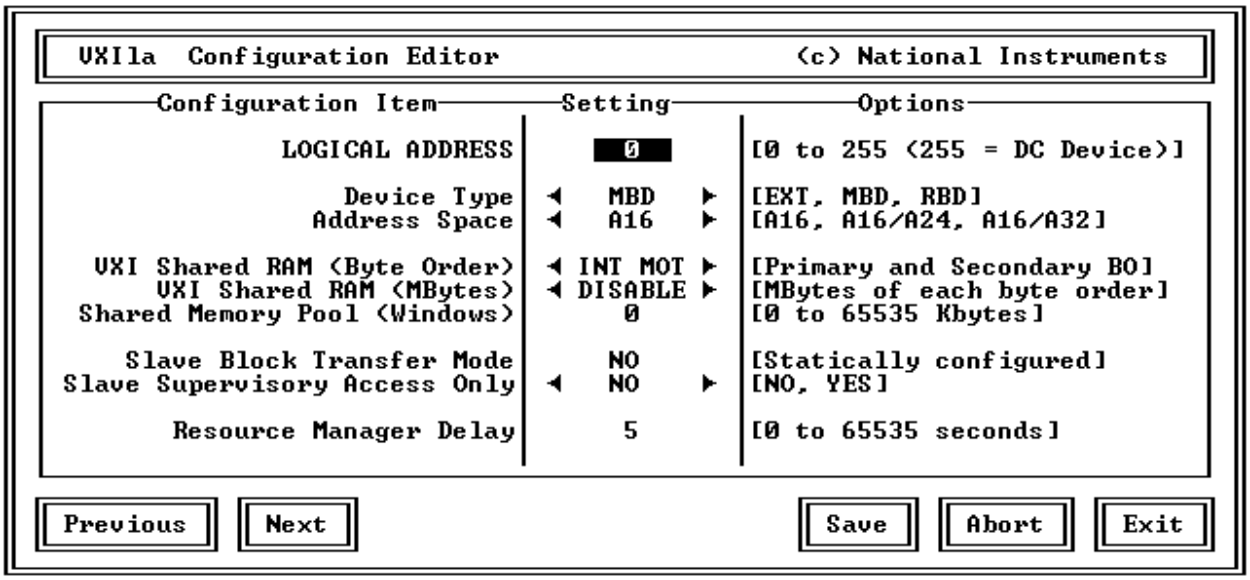


Figure 4-2. VXIpc-486 Logical Address Configuration Editor

Logical Address

The logical address is an 8-bit number that uniquely identifies the VXIpc-486. It can be configured as a static device with a logical address range from 0 through 254. Logical address 255 configures the VXIpc-486 as a dynamic device, as specified in the *VXIbus System Specification*. The default logical address is 0. If you do not want the VXIpc-486 to be the system Resource Manager, change this value to an unused logical address other than 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-486 Device Type affects only the contents of the Device Class field in the Device Type register. The functionality of the other registers does not change.

Address Space

This field indicates the addressing mode(s) of the device's operational registers. The VXIpc-486 can be configured as an A16 only, A16/A24, or A16/A32 device. The default is A16 only.

VXI Shared RAM (Byte Order)

The Model 500 Series VXIpc-486 local RAM can be slave-accessed in either A24 or A32 space in D08, D16, and D32 data transfer modes. This field, which indicates the primary and secondary byte swapping schemes for slave accesses to the local RAM space, can be set to either Intel (`INT`, Little Endian) or Motorola (`MOT`, Big Endian). The default primary byte ordering is Intel for backward compatibility reasons. When the addressing mode is A16 only, this field is ignored.

VXI Shared RAM (MBytes)

This field indicates the number of megabytes of local RAM that are shared in either A24 or A32 space. The VXIpc-486 can be set up to have either one or two windows into the local RAM. When set up with one window, all slave accesses through this window use the primary byte order scheme. When there are two windows, accesses through the first (lower) window see the local RAM using the primary byte order scheme, and accesses through the second (upper) window see the same local RAM but use the secondary byte order scheme. In Table 4-1, *primary* and *secondary* byte order refer to the setting of the previous field. When the addressing mode is A16 only, this field should be set to `DISABLED`.

Table 4-1. VXI Shared RAM Options

Address Space	Options	Description
A16	DISABLED	VXI Shared RAM disabled
A16/A24	4, 0	Four megabytes of local RAM are shared in A24 space. Slave accesses to this RAM are in the primary byte order.
	4, 4	In this option, 4 MB of local RAM are shared, but 8 MB are requested in A24 space. Accesses to the lower 4 MB are in the primary byte order, and accesses to the upper 4 MB see the same local RAM in the secondary byte order.
	8, 0	Eight megabytes of local RAM are shared in A24 space, and slave accesses to this RAM are in the primary byte order.

(continues)

Table 4-1. VXI Shared RAM Options (Continued)

Address Space	Options	Description
A16/A32	4, 0	Four megabytes of local RAM are shared in A32 space. Slave accesses to this RAM are in the primary byte order.
	4, 4	In this option, 4 MB of local RAM are shared, but 8 MB are requested in A32 space. Accesses to the lower 4 MB are in the primary byte order, and accesses to the upper 4 MB see the same local RAM in the secondary byte order.
	8, 0	Eight megabytes of local RAM are shared in A32 space, and slave accesses to this RAM are in the primary byte order.
	8, 8	In this option, 8 MB of local RAM are shared, but 16 MB are requested in A32 space. Accesses to the lower 8 MB are in the primary byte order, and accesses to the upper 8 MB see the same local RAM in the secondary byte order.
	ALL, 0	Thirty-two megabytes of local RAM are shared in A32 space, and slave accesses to this RAM are in the primary byte order.

Shared Memory Pool (Windows)

This field indicates the size of memory in kilobytes that is allocated on Windows startup to be used exclusively by `VXImemAlloc` function calls from both DOS and Windows NI-VXI applications. If you do not have Microsoft Windows installed on your system, or if you will not be running DOS NI-VXI applications under Windows, set this field to 0 KB. The allowable range is from 0 to 65535 KB. The default value is 0 KB.

Slave Block Transfer Mode

The VXIpc-486 does not currently support block transfers in either slave or master-mode accesses. This field is statically configured to `NO`, and cannot be changed.

Slave Supervisory Access Only

When `YES` is selected, the VXIpc-486 will acknowledge only 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-486 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.

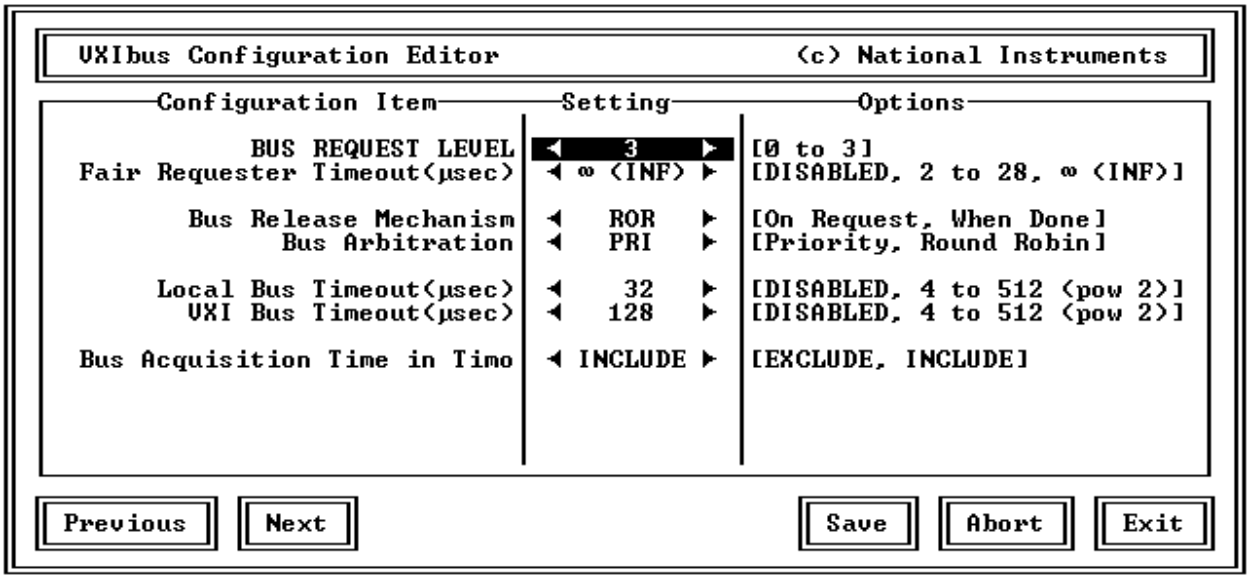


Figure 4-3. VXIpc-486 Bus Configuration Editor

Bus Request Level

This field sets the VXIbus request level (BR0-3) for the VXIpc-486. The default value is level 3.

Fair Requester Timeout

You can configure the VXIpc-486 as a fair requester (Request On No Request, or `RONR`) with a timeout period of either infinity or within the range of 2 to 28 µs (increments of 2 µs), or you can configure it as an unfair requester by selecting the field value of `DISABLE`. The default value is ∞ (`INF`), specifying an infinite timeout period.

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-486 is the Slot 0 device.

Local Bus Timeout

This field sets the timeout period for the VXIpc-486 local bus. You can set the timeout within the range from 4 to 512 µs in powers of 2 (4, 8, 16, 32, 64, 128, 256, and 512), or you can disable this function. The default value is 32 µs. When the VXIpc-486 is not the System Controller, you should select DISABLE. In such a case, you should have configured the VXIpc-486 as a Non-Slot 0 device as described in Chapter 2.

VXIbus Timeout

This field sets the timeout period for the VXIbus bus timeout (BTO) unit. When the VXIpc-486 is the System Controller, you can set the BTO period within the range from 4 to 512 µs in powers of 2 (4, 8, 16, 32, 64, 128, 256, and 512). The default value is 128 µs. When the VXIpc-486 is not the System Controller, you should select DISABLE. In such a case, you should have configured the VXIpc-486 as a Non-Slot 0 device as described in Chapter 2.

Bus Acquisition Time in Timeout

This field determines whether the arbitration time to acquire the VXIbus is included in the local bus timeout. In embedded-only systems, the default is to include bus acquisition time. In MXI systems, however, the arbitration time may be excessively long. In such a case, it may be preferable to exclude the bus acquisition time from the overall timeout.

Device Configuration

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

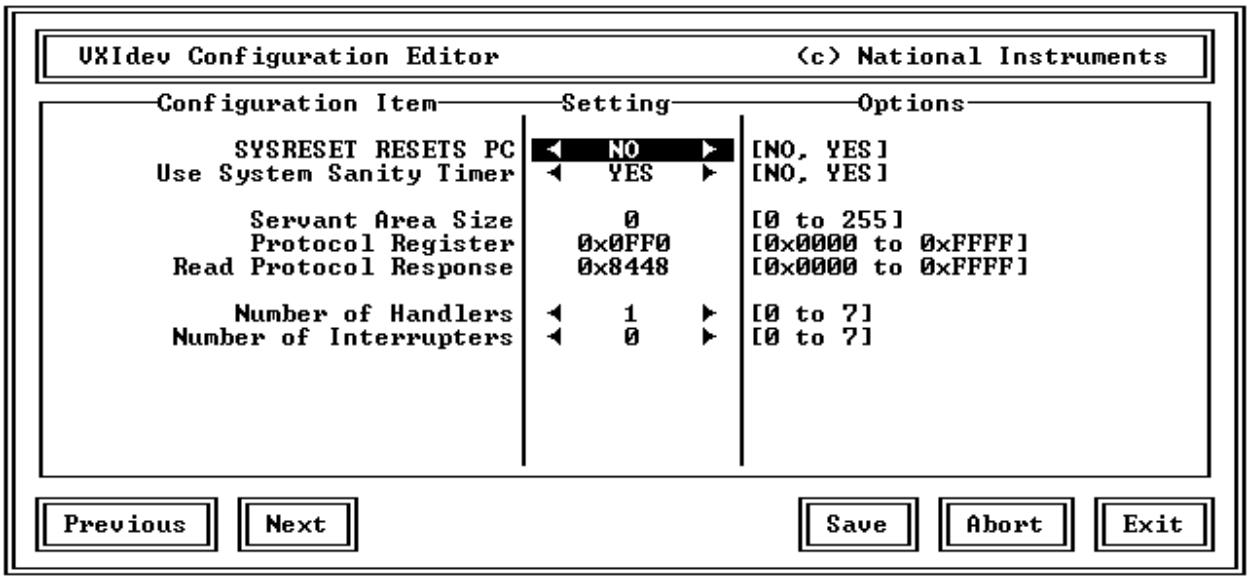


Figure 4-4. VXIpc-486 Device Configuration Editor

SYSRESET Resets PC

When YES is selected, a SYSRESET on the backplane causes the VXIpc-486 to reboot. When NO is selected, a SYSRESET on the backplane does not reboot the VXIpc-486. The default value for this field is NO.

Use System Sanity Timer

When YES is selected, if a misbehaved NI-VXI application causes the system to hang, the VXIpc-486 asserts the SYSFAIL* signal on the backplane. When NO is selected, if the system hangs, the VXIpc-486 does not assert SYSFAIL*. In general, the sanity timer is useful by alerting you that your application has gone awry. However, you should turn off the sanity timer when debugging an NI-VXI application because some debuggers conflict with the sanity timer mechanism. The default value for this field is YES.

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-486 is *not* the Resource Manager in your system). The Servant Area size is an 8-bit value (0 through 255) that indicates the VXIpc-486 Servant area. The Servant area begins at the logical address following the VXIpc-486 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-486 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-486* is *the Resource Manager, this setting is irrelevant.***

Protocol Register

This field specifies the contents of the Protocol register, indicating which protocols the device supports. This field is meaningful only when the VXIpc-486 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-486 from the Resource Manager (if the VXIpc-486 is *not* the Resource Manager in your system). This field is meaningful only when the VXIpc-486 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-486 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-486 supports, which can range from 0 to 7. The default value is 0.

Exiting VXIEDIT and Reinitializing 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 reinitialize 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 *Model 500 Series VXIpc-486 Hardware and Software Configuration Form* in Appendix I.

Running VXITEDIT

As an alternative to VXIEDIT you can use VXITEDIT, a text-based VXI resource editor. To run VXITEDIT from any directory, make sure that both the PATH and NIVXIPATH environment variables have the destination directory of the NI-VXI software added to it. PATH is used to find the application itself, while NIVXIPATH is used by the different configuration files (*.CFG), table files (*.TBL), and help files (*.HLP) in its execution. The default pathname used by the program if NIVXIPATH is not set is C:\NIVXI.

Type *VXITEDIT.EXE* to start the program. Refer to the *NI-VXI Text Utilities Reference Manual* for further information on how to use VXITEDIT.

Exiting VXITEDIT and Reinitializing the Hardware

To exit VXITEDIT, type *exit* or the number *11* when the main menu is displayed. If you changed any information, you are prompted to save your changes before exiting the menu. Saving the configuration information updates the configuration files VXILA.CFG, VXIBUS.CFG, and VXIDEV.CFG. Run VXIINIT.EXE to reinitialize 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 *Model 500 Series VXIpc-486 Hardware and Software Configuration Form* in Appendix I.

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 or VICTEXT) to write to and read from your instruments. Both programs display the status of your VXI transactions and inform you of any errors that occur. Refer to the *NI-VXI DOS Utilities Reference Manual* on how to use VIC and to learn about its features, and to the *NI-VXI Text Utilities Reference Manual* on how to use VICTEXT and to learn about its features.

NIVXIDOS.LIB is the NI-VXI Large Memory Model function library for the Microsoft C and Borland C Language interfaces. To use the NI-VXI software in your application program, you must compile your program for the large memory model, and 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 include files for the NI-VXI software are in the INCLUDE subdirectory.

Note: ***It is essential to include "NIVXI.H" before any other include file in your application program.***

The EXAMPLES subdirectories contain 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.

Note: ***When compiling NI-VXI applications, you must define the macro VXIDOS in your makefile/project. Refer to the example programs for details.***

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.

Appendix A
Specifications

This appendix lists various module specifications of the Model 500 Series VXIpc-486, such as physical dimensions and power requirements. Unless otherwise indicated, all specifications apply to both the Model 500 and Model 566 versions of the VXIpc-486.

CPU

Microprocessor	50 MHz 80486DX-2 (Model 500) 66 MHz 80486DX-2 (Model 566)
RAM	1, 2, 4, 5, 8, 16, or 32 MB
Hard Disk	80, 105, 220, 240, 525, or 1200 MB

Physical

C-size VXIbus Module

Slot Requirements	486/1: 1 slot 486/2: 2 slots 486/3: 3 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
- External floppy disk (EFD) connector
- IEEE 488 connector
- CLK10 I/O connector
- Trigger Input connector
- Audio/Trigger Output connector

Power Requirements

Source	1-Slot Module Direct Current (max)	Dynamic Current (max)	2-Slot, 3-Slot Modules Direct Current (max)
+5 VDC	6.5 A	Not Available	8 A
+12 VDC	20 mA	Not Available	200 mA
-12 VDC	20 mA	Not Available	20 mA
-5.2 VDC	150 mA	Not Available	150 mA
-2 VDC	200 mA	Not Available	200 mA

Cooling Requirements

Power Dissipation, max — Refer to ID label

Emissions

EMI — FCC Class A Verified

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

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

VXIbus

- VXIbus System Specification 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

Appendix B
Front Panel Indicators

This appendix describes the function of the seven front panel LED indicators on the Model 500 Series VXIpc-486. 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 indicates only that one of the modules is driving SYSFAIL on the VXIbus backplane.

When the FAILED LED is lit, the VXIpc-486 is driving the SYSFAIL signal. The FAILED LED, together with the green TEST and ON LINE LEDs, indicate the status of the VXIpc-486. The status LED indications are shown in Table B-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 B-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-486 MODID line is asserted or when the VXIbus registers or shared memory are accessed by another bus master.

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

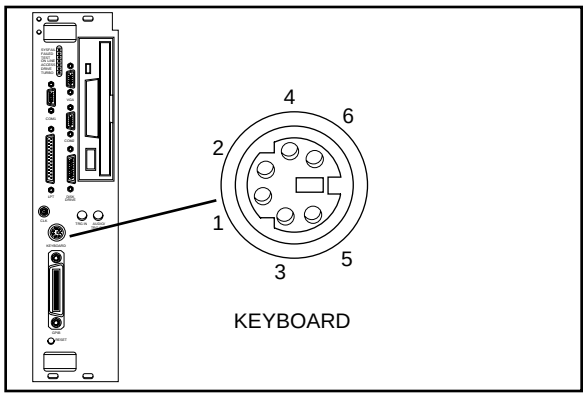
The green TURBO light is not used and is never lit on the Model 500 Series VXIpc-486.

Appendix C
Connectors

This appendix describes the Model 500 Series VXIpc-486 front panel and VXIbus connector pinouts.

Note: ***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



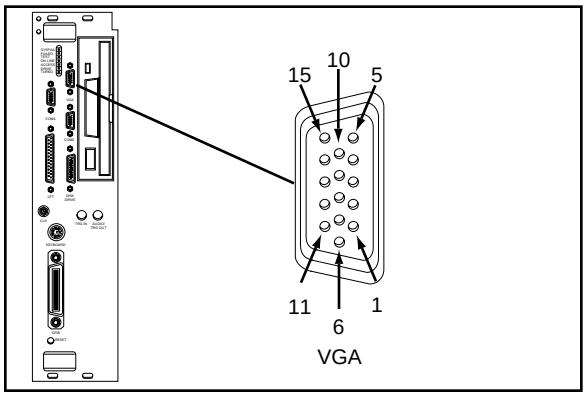
Connector Type:
6-pin Mini DIN

Figure C-1. KEYBOARD Connector

Table C-1. KEYBOARD Connector Signals

Pin	Signal Name	Signal Description
1	DATA	Data
2	GND	Ground
3	GND	Ground
4	+5V	+5 volts
5	CLK	Clock
6	GND	Ground

VGA



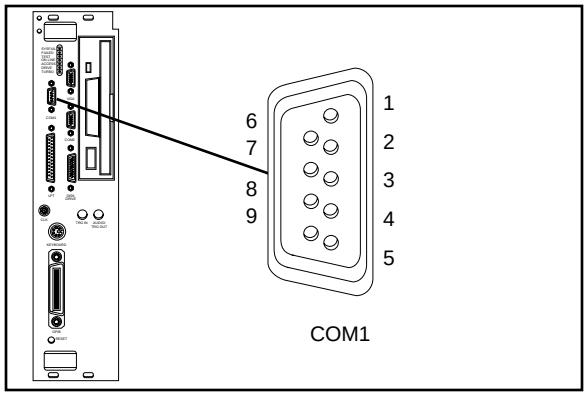
Connector Type:
15-pin Subminiature
DHD-22

Figure C-2. VGA Connector

Table C-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

COM1



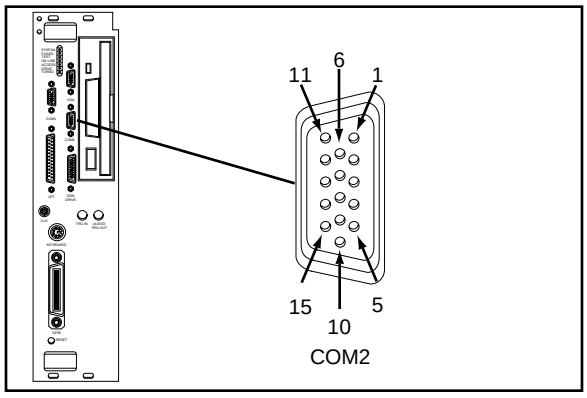
Connector Type:
9-pin Subminiature
DHD-20

Figure C-3. COM1 Connector

Table C-3. COM1 Connector Signals

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

COM2/GPIO



Connector Type:
15-pin Subminiature
DHD-22

Figure C-4. COM2/GPIO Connector

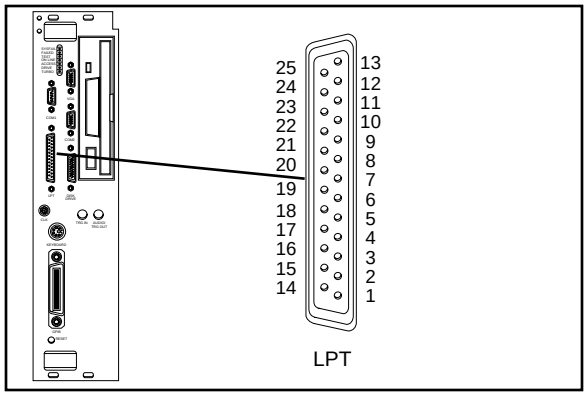
Table C-4a. COM2/GPIO Connector COM2 Signals

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
15	DTR*	Data Terminal Ready

Table C-4b. COM2/GPIO Connector GPIO Signals

Pin	Signal Name	GPIO Signal Description
7	n.c.	not connected
8	GPIO 7	General Purpose Input/Output 7
9	GPIO 5	General Purpose Input/Output 5
10	n.c.	not connected
11	GPIO 9	General Purpose Input/Output 9
12	GPIO 8	General Purpose Input/Output 8
13	GPIO 6	General Purpose Input/Output 6
14	GPIO 4	General Purpose Input/Output 4

LPT



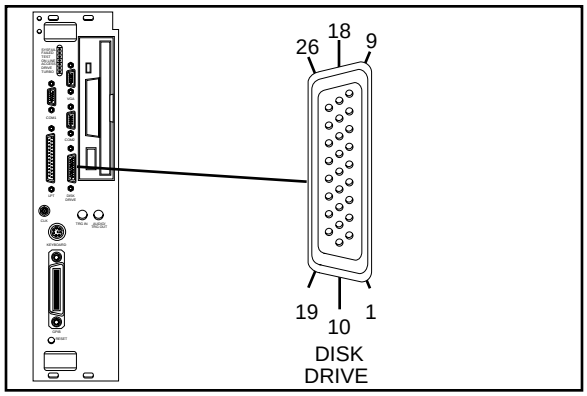
Connector Type:
25-pin Subminiature
DHD-20

Figure C-5. LPT Connector

Table C-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
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

Floppy Disk Drive



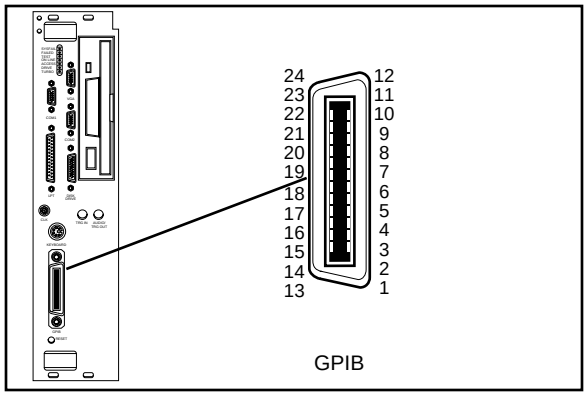
Connector Type:
26-pin Subminiature
DHD-22

Figure C-6. DISK DRIVE Connector

Table C-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
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

GPIB



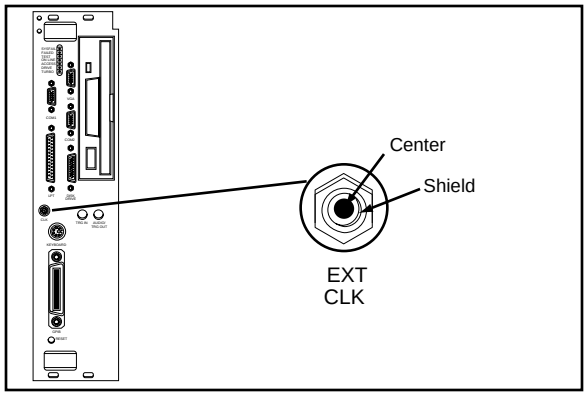
Connector Type:GPIB

Figure C-7. GPIB Connector

Table C-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
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

External CLK10



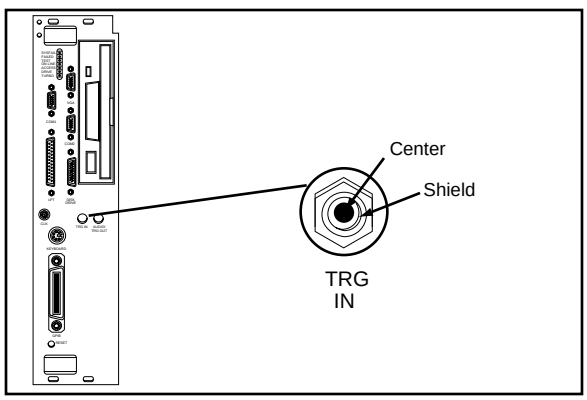
Connector Type: SMB

Figure C-8. EXT CLK Connector

Table C-8. EXT CLK Connector Signals

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

External Trigger Input



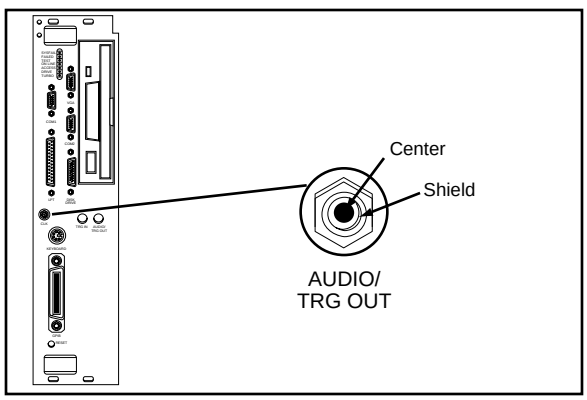
Connector Type: SMB

Figure C-9. TRG IN Connector

Table C-9. TRG IN Connector Signals

Pin	Signal Description
Center	Trigger Input Signal
Shield	Ground

External Audio/Trigger Output



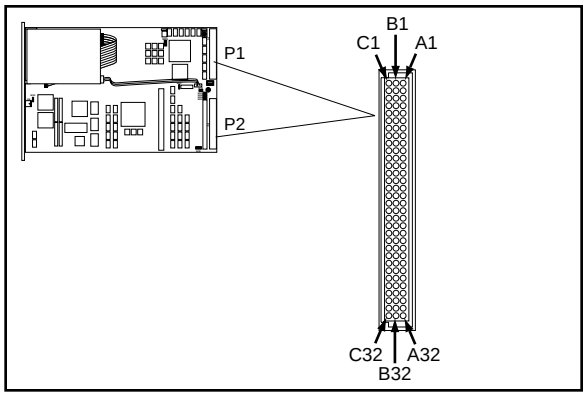
Connector Type: SMB

Figure C-10. AUDIO/TRG OUT Connector

Table C-10. AUDIO/TRG OUT Connector Signals

Pin	Signal Description
Center	Audio/Trigger Output Signal
Shield	Ground

VXIbus P1 and P2



Connector Type:
96-pin DIN

Figure C-11. VXIbus Connector

Table C-11. VXIbus P1 Connector Signals

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

(continues)

Table C-11. VXIbus P1 Connector Signals (Continued)

Pin	Row A Signals	Row B Signals	Row C Signals
26	A05	ORQ5	A12
27	A04	IRQ4	A11
28	A03	IRQ3	A10
29	A02	IRQ2	A09
30	A01	IRQ1	A08
31	-12 V	not connected	+12 V
32	+5 V	+5 V	+5 V

Table C-12. VXIbus P2 Connector Signals

Pin	Row A Signals	Row B Signals	Row C Signals
1	ECLTRG0	+5 V	CLK10+
2	-2 V	GND	CLK10-
3	ECLTRG1	not connected	GND
4	GND	A24	-5.2 V
5	MODID12	A25	not connected
6	MODID11	A26	not connected
7	-5.2 V	A27	GND
8	MODID10	A28	not connected
9	MODID09	A29	not connected
10	GND	A30	GND
11	MODID08	A31	not connected
12	MODID07	GND	not connected
13	-5.2 V	+5 V	-2 V
14	MODID06	D16	not connected
15	MODID05	D17	not connected
16	GND	D18	GND
17	MODID04	D19	not connected
18	MODID03	D20	not connected
19	-5.2 V	D21	-5.2 V
20	MODID02	D22	not connected
21	MODID01	D23	not connected
22	GND	GND	GND
23	TTLTRG0*	D24	TTLTRG1*
24	TTLTRG2*	D25	TTLTRG3*
25	+5 V	D26	GND
26	TTLTRG4*	D27	TTLTRG5*
27	TTLTRG6*	D28	TTLTRG7*
28	GND	D29	GND
29	not connected	D30	not connected
30	MODID00	D31	GND
31	GND	GND	not connected
32	not connected	+5 V	not connected

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 Model 500 Series VXIpc-486/2 or VXIpc-486/3 equipped with the I/O expansion kit.

Some VXIpc-486/2 and VXIpc-486/3 models are equipped with an expansion kit that accommodates installation of either two PC/XT-height boards, or one PC/XT-height and one PC AT-height board. National Instruments offers several plug-in expansion boards you can use. Please contact National Instruments to find out what is currently available to expand your VXIpc-486.

When installing an I/O board you must use a panel bracket, as shown in the reference drawing 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-486/2 or VXIpc-486/3 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: Bright Nickel Plate

Alternatively, you can modify the blank panels provided with the VXIpc-486/2 or VXIpc-486/3. 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-486 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.

Appendix E
VXIpc-486 Plug-in Boards

The Model 500 Series VXIpc-486 has several configurations that include an expansion kit for installing plug-in boards. There are several considerations for these plug-in boards that may be a bit confusing. This appendix contains information intended to clarify the different configurations by describing the considerations for plug-in boards for the VXIpc-486.

Height of VXIpc-486 Plug-in Boards

The key issue to consider for plug-in PC boards for the VXIpc-486 is the *height* of the plug-in PC board. Our literature distinguishes between a *PC board* and a *PC AT board* in describing the different expansion kit configurations. When our literature refers to PC versus PC AT, it is a reference to the height of the board, rather than whether the board has a 16-bit or 8-bit interface to the PC bus. Both connectors for plug-in boards support both 8-bit and 16-bit boards. The issue is the physical space requirements. The height of a plug-in board is defined as the overall dimension from the bottom of the bus connector to the top of the board, as shown in Figure E-1.

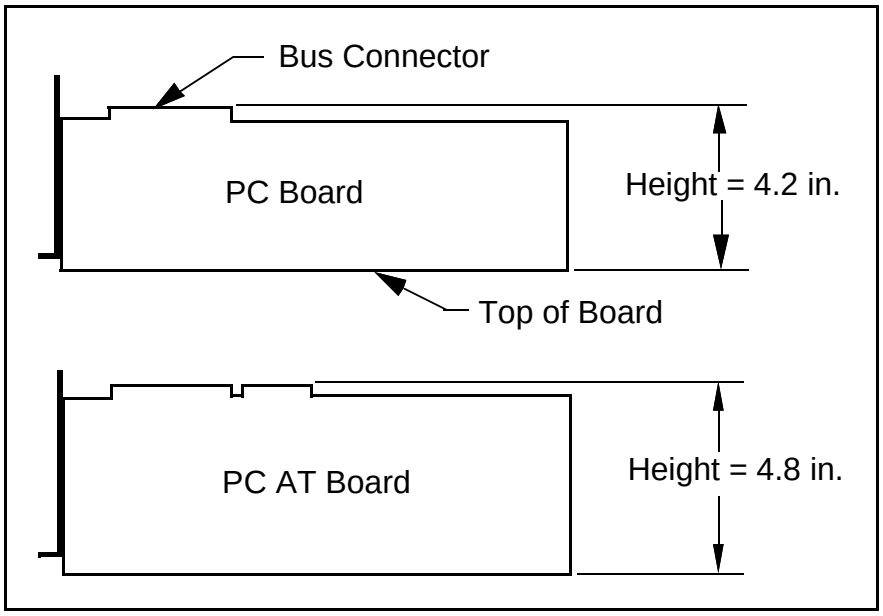


Figure E-1. Height Comparison of PC Boards Versus PC AT Boards

As Figure E-1 shows, a *PC board* is less than or equal to 4.2 in. in height, while a *PC AT board* is 4.2 in. or 4.8 in. in height. Figure E-2 shows how PC-height boards are installed in the Model 500 Series VXIpc-486 expansion kit.

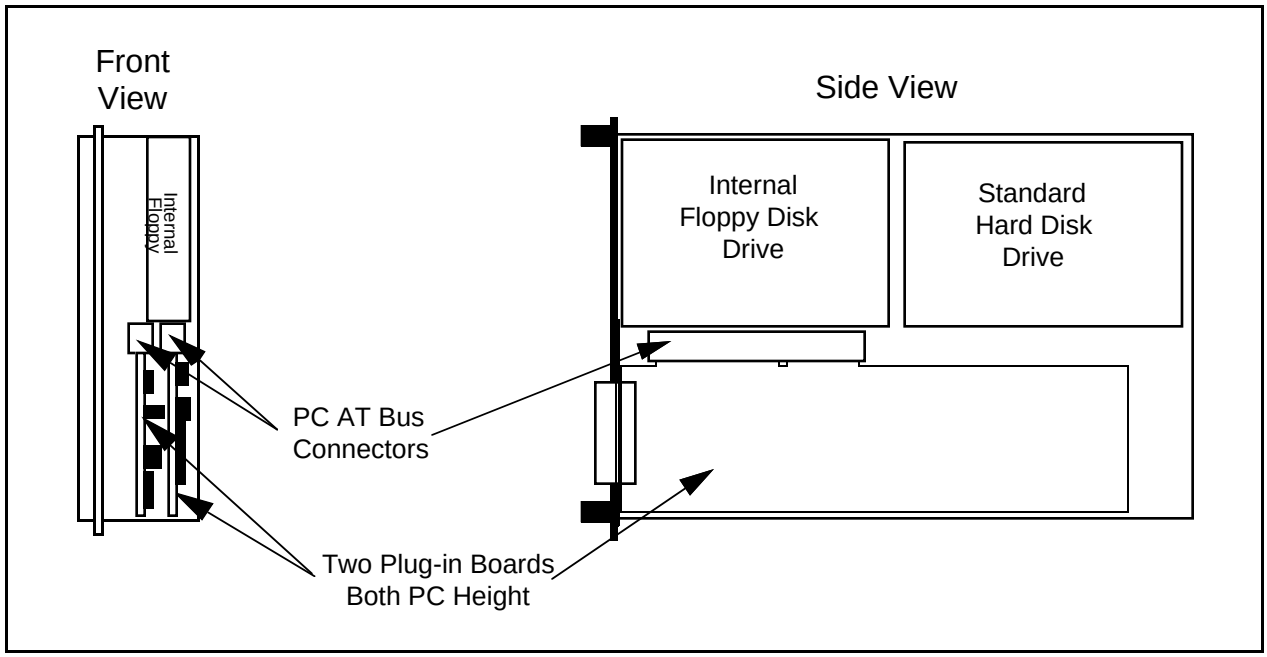


Figure E-2. Installing PC-Height Boards in a VXIpc-486 System

Notice that with an internal floppy and hard disk drive only PC-height boards (4.2 in.) can be installed (PC-height boards with a 16-bit PC AT bus interface can be used, however). A PC AT-height board (4.8 in.) will not fit.

To accommodate a PC AT-height board, one of the connectors for the plug-in boards is moved into the floppy drive area as shown in Figure E-3. From the front view, the leftmost plug-in board (first one installed) must still be PC height while the rightmost (second one installed) can be PC AT height. This is an important distinction because there are also restrictions on the length of the boards, as described in the following section.

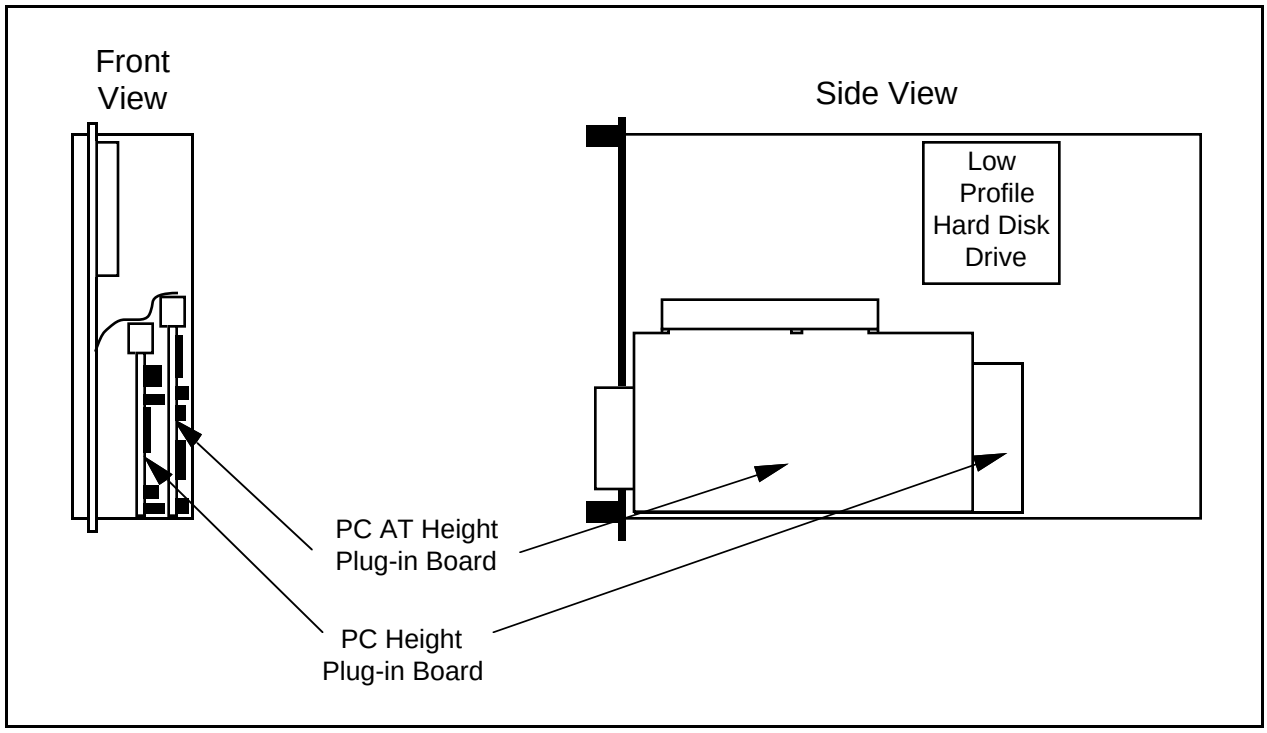


Figure E-3. Installing PC AT-Height Boards in a VXIpc-486 System

Length of VXIpc-486 Plug-in Boards

This section discusses the restrictions on the length of the boards that can be installed into the expansion kit on a Model 500 Series VXIpc-486. When you install a plug-in board, the front end of the board (the end that sticks out of the VXIpc-486 front panel) is firmly supported because it is screwed to the front panel of the VXIpc-486. A user-defined bracket is required on the expansion boards per National Instruments drawing 181300-01, *PC/AT Card Blank Panel*. The considerations on the length of the plug-in boards regard support for the back end of the board.

Figure E-4 shows the VXIpc-486 expansion kit with no boards installed. Notice that the expansion kit has a metal plate and moveable brackets that can move along the metal plate to support the back end of the plug-in boards (refer to Figure E-5). Two moveable brackets are required to support two boards. The one-board version is installed while the two-board version is available separately as kit number 776713-02. The longest board that the moveable bracket can support is 8.2 in. Notice, however, that there are fixed supports for the PC AT board at the back of the module.

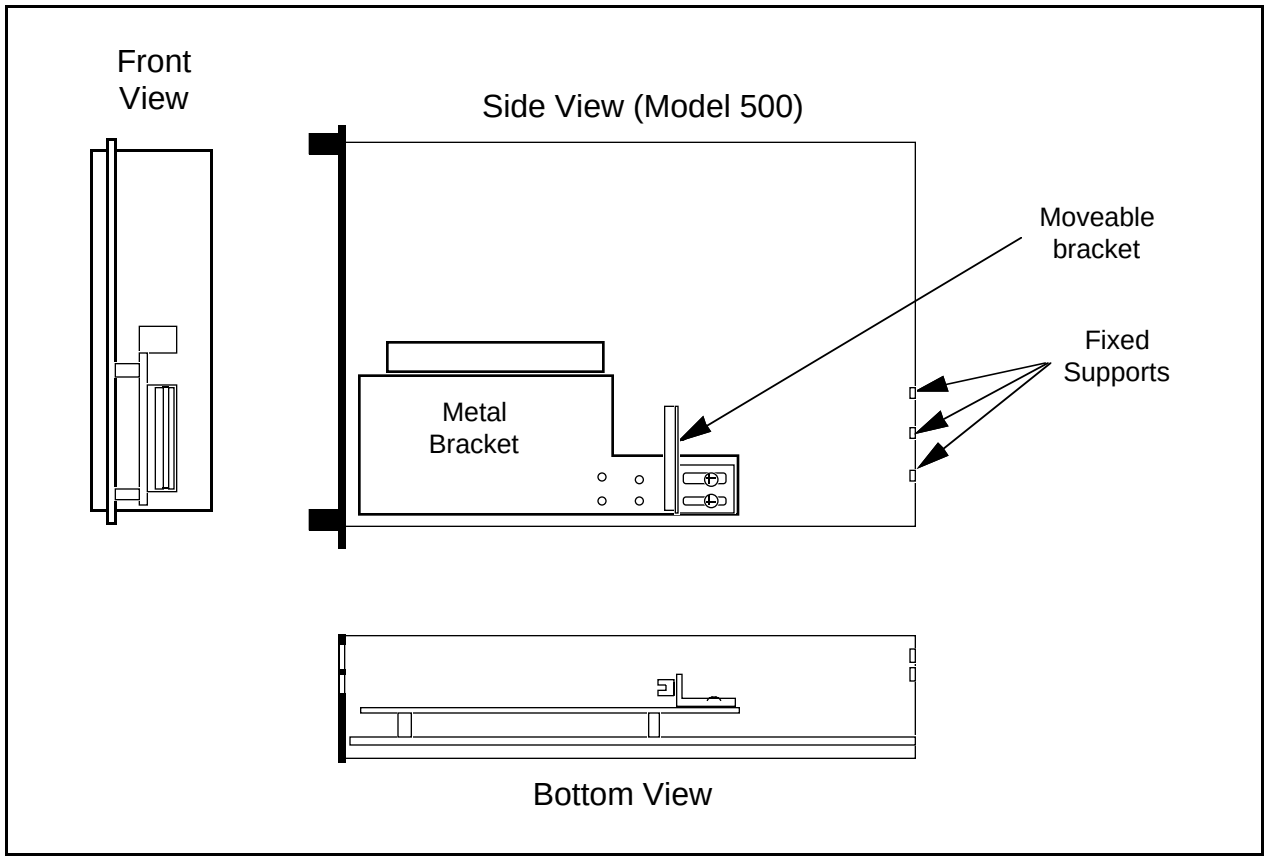


Figure E-4. VXIpc-486 Expansion Kit with No Boards Installed

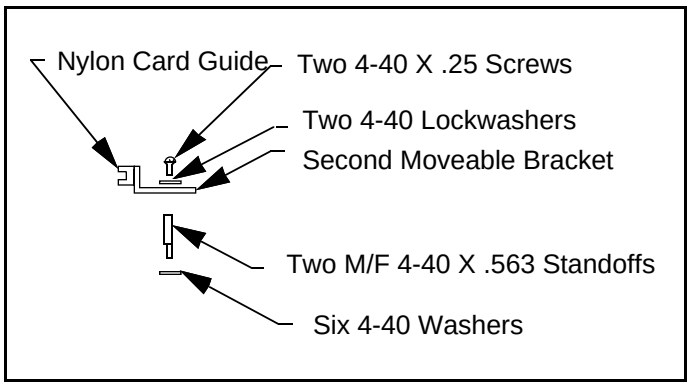


Figure E-5. Kit Number 776713-02 for Two-Board Expansion (Model 500 Series)

The first board you install into a VXIpc-486 expansion kit can be less than or equal to 8.2 in. and can be supported using a moveable bracket, as shown in Figure E-6.

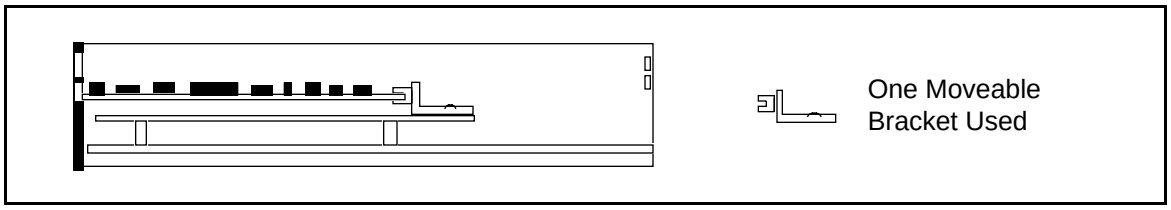


Figure E-6. First Board 8.2 in. Long or Less

While you can physically install a board that is between 8.2 in. and 13.4 in. long into the VXIpc-486, the back end will not be supported inside the VXIpc-486 (see Figure E-7). This may not be an issue in some applications, but if the application expects rugged handling it may be inadvisable to install the board without a support.

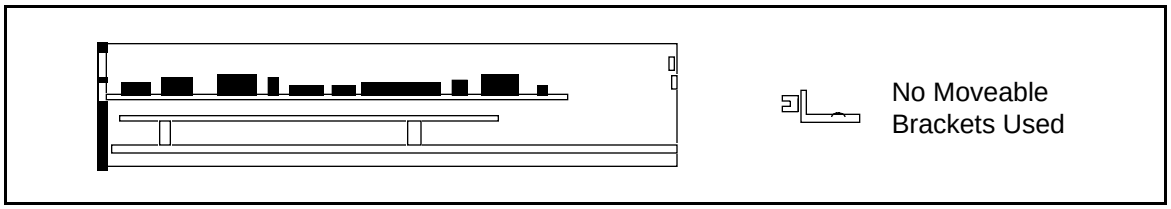


Figure E-7. First Board between 8.2 in. and 13.4 in. Long

After installing the first board, you can install the second board above it. If the second board is less than or equal to 8.2 in. long, you can use the second moveable bracket to support it. Figures E-8 and E-9 show configurations that require the use of both brackets.

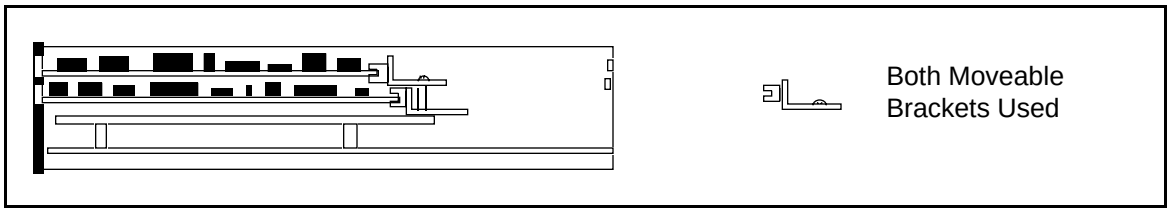


Figure E-8. Both Boards 8.2 in. Long or Less

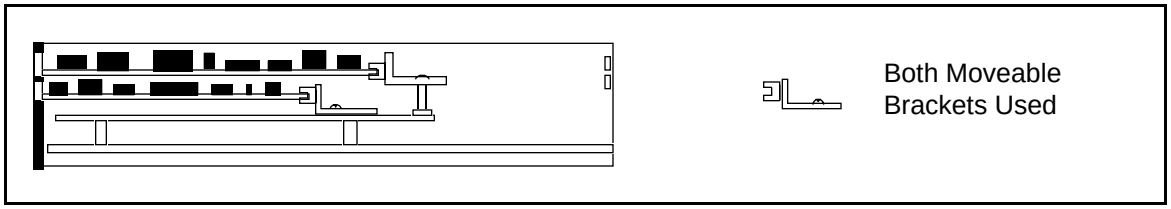


Figure E-9. First Board Less than 8.2 in. Long,
Second Board 8.2 in. Long or Less, but Longer than the First Board

The second board cannot be supported if it is shorter than the first board by a difference greater than one inch, as shown in Figure E-10. Remember that PC AT-height boards can be used in the second expansion slot only.

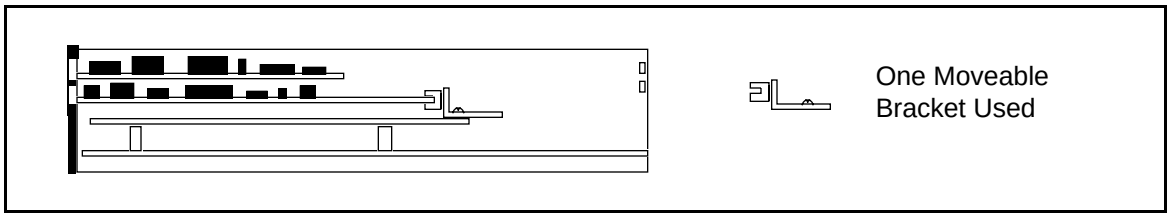


Figure E-10. First Board 8.2 in. Long or Less,
Second Board over One Inch Shorter than First Board

While you can physically install a board that is between 8.2 in. and 13.4 in. long, the back end will not be supported. This may not be an issue in some applications, but if the application expects rugged handling it may be inadvisable to install the board without a support. Figures E-11 and E-12 show two examples in which the second board is unsupported because it is between 8.2 in. and 13.4 in. long.

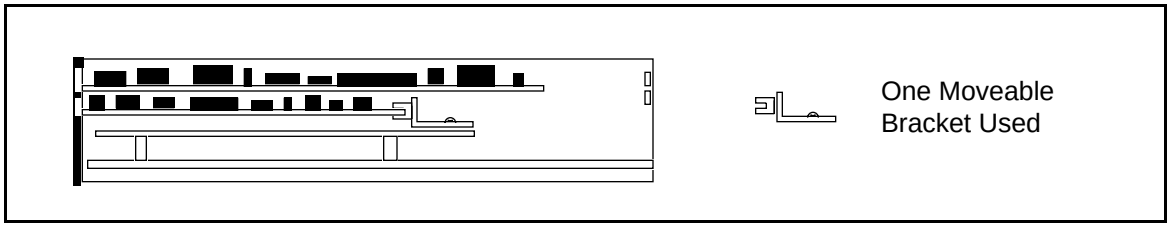


Figure E-11. First Board 8.2 in. Long or Less,
Second Board between 8.2 in. and 13.4 in. Long

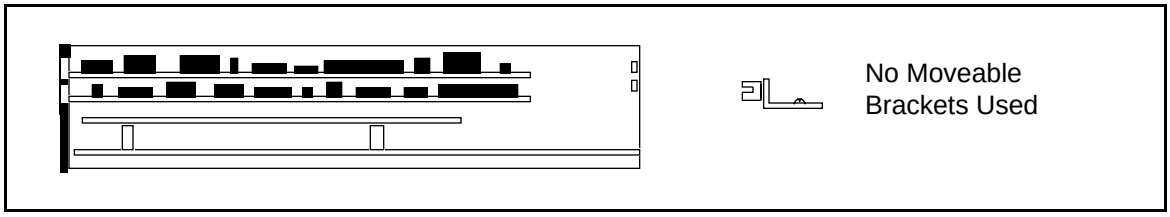


Figure E-12. Both Boards Between 8.2 in. and 13.4 in. Long

Finally, you can install a full-length (13.4 in.) board and utilize the fixed supports at the back of the Model 500 Series VXIpc-486, as shown in Figures E-13 through E-15.

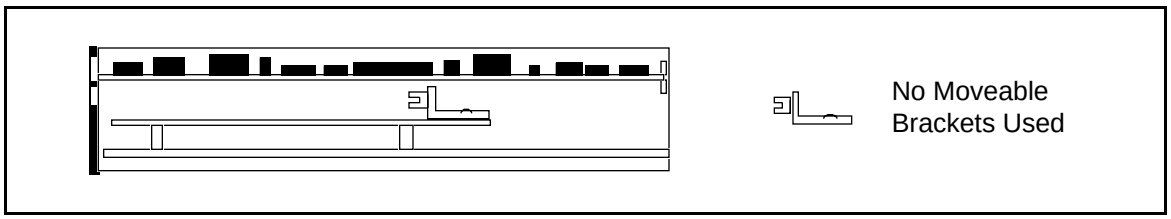


Figure E-13. Second Board Full 13.4 in. Long

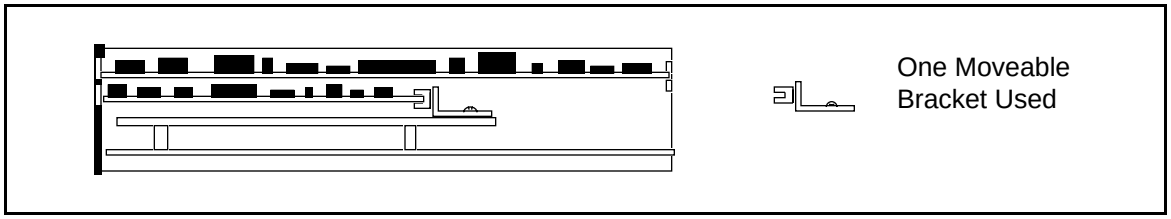


Figure E-14. First Board 8.2 in. Long or Less,
Second Board Full 13.4 in. Long

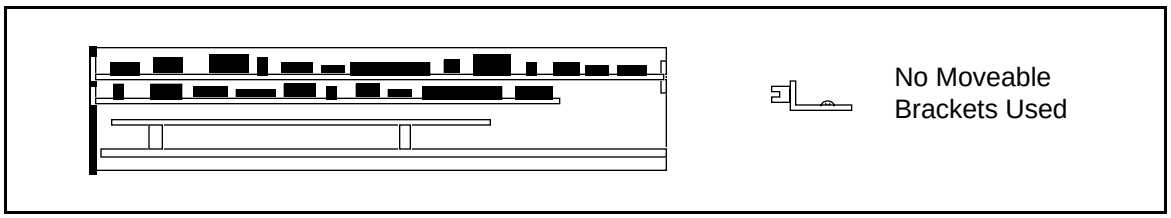


Figure E-15. First Board between 8.2 in. and 13.4 in. Long,
Second Board Full 13.4 in. Long

Appendix F
VXIpc-486 Hardware Configuration

This appendix contains hardware configuration information about the Model 500 Series VXIpc-486 regarding memory map locations, I/O address map locations, interrupt lines, and DMA channels.

Table F-1 shows the memory map locations used by the Model 500 Series VXIpc-486 hardware windows to the VXIbus, and plug-in PC board expansion slots. Table F-2 lists the I/O addresses that are used by the VXIpc-486 and the Ethernet option. Table F-3 lists the hardware interrupt lines used by the Model 500 Series VXIpc-486, along with the corresponding functionality assigned to each line. Table F-4 lists the PC AT DMA channels used by the Model 500 Series VXIpc-486, along with the corresponding functionality assigned to each channel.

When installing plug-in PC AT boards into a VXIpc-486 expansion slot, be careful to avoid conflicts with the VXIpc-486 hardware setting. All other VXIpc-486 motherboard I/O devices are mapped according to industry-standard PC AT conventions.

Table F-1. VXIpc-486 Memory Map

Start-End Address	Size	VXIbus Access
A0000–BFFFF	128 KB	Super VGA
C8000–CFFFF	32 KB	VXI A16 Space Window
D0000–DFFFF	64 KB	For Plug-In PC Expansion Boards
E0000–EFFFF	64 KB	VXI A24/A32 Space Window

Table F-2. VXIpc-486 I/O Address Map

Address	Device
00H - FFH	Reserved
100H - 17FH	Available
180H - 19FH	GPIB
1A0H - 1EFH	Available
200H - 207H	Reserved
208H - 21FH	Available
220H - 23FH	Ethernet Option Default
240H - 277H	Available
278H - 27FH	Reserved
280H - 2F7H	Available
2F8H - 32FH	Reserved
330H - 35FH	Available
360H - 3FFH	Reserved

Table F-3. VXIpc-486 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-xx Installed)
6	Floppy Disk
7	Printer
8	Clock
9	Free for Plug-In PC Boards
10	Free for Plug-In PC Boards
11	GPIB
12	VXI (MIGA, VMEbus Interrupts, Triggers)
13	Reserved
14	Hard Drive
15	Free for Plug-In PC Boards

Table F-4. VXIpc-486 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

Appendix G
Configuring the Super VGA Option

Introduction

This appendix describes the Super VGA (video graphics adapter) driver option you can use with your Model 500 Series VXIpc-486. The standard VGA graphics format is 640 by 480 pixels, with 16 available colors. You can use Super VGA to improve the graphic image in one of two ways–either by increasing your color options to 256 colors or by substantially increasing the resolution to 1024 by 768 pixels. You can benefit from the clarity of Super VGA when you want to edit or view an especially complex image in graphics or CAD programs.

If you ordered your Model 500 Series VXIpc-486 with the Super VGA option installed, you only need to modify the system settings according to the following section. If your Super VGA option was not installed at the factory, refer to the installation instructions later in this appendix.

The Super VGA option is not available for the Model 200 Series VXIpc-486.

Warning: ***The Chips & Technology Super VGA video output is specified for monitors having a horizontal scan rate of at least 50 kHz with a vertical scan rate of 60 Hz. Be certain your monitor meets this specification. There are a variety of low-cost monitors on the market that have a horizontal scan rate less than 50 kHz. Enabling the Super VGA option on a monitor that does not meet this specification will cause damage to your monitor.***

Modifying the System Settings

You must modify the system settings of Windows 3.x to change the application video to Super VGA. For example, to display all of the available Windows graphics drivers in Windows 3.1, perform the following steps. The Super VGA option must already be installed.

1. From the **Main** folder, open the **Windows Setup** window by double-clicking on the icon. The window displays your current hardware and software settings.

2. From the **Options** menu, select the **Change System Settings** dialog box. The **Display** field reads VGA by default.

3. Use your mouse or the <Alt-Down Arrow> keys to scroll through the options for the **Display** field. Among several other options you will find three Chips & Technology entries available for the Model 500 Series VXIpc-486 after the Super VGA option is installed.

- *** CHIPS 452 VGA 640x480 256 Color**
- *** CHIPS 452 VGA 800x600 16 Color**
- *** CHIPS 452 VGA 1024x768 16 Color**

4. The first option changes the default of 16 colors to 256 colors. The second and third options increase the resolution to 800 by 600 pixels or 1024 by 768 pixels, respectively. Highlight the Super VGA option you want to use and press the **OK** button.

5. The program prompts you to restart Windows. Follow the instructions as given by the prompts. The Super VGA resolution is now in effect.

Installing the Super VGA Drivers

If you did not order the Super VGA drivers with your Model 500 Series VXIpc-486 kit, follow these steps to install the Super VGA drivers.

1. Insert the VXIpc-486/500 SVGA Drivers Disk 1 of 3 into drive A of the VXIpc-486.

2. Change to drive A by typing the following command at the `C:\>` prompt in the root directory.

   `A:` <Enter>

3. From the `A:\>` prompt, type the following command.

   `setup` <Enter>

4. Press any key when directed by the following prompt.

   `<< Press Any Key to Continue >>`

5. The main menu appears. At this point you can select the appropriate graphics driver. For instance, to install the Windows 3.1 Super VGA driver, use the cursor keys to highlight the selection **Windows Version 3.1**, then press <Enter>.

6. Once you have selected a driver, a screen appears prompting you to select a video resolution to install. The default is **All Resolutions**. Press <Enter> to install.

7. To install the Super VGA driver, press <End>.

8. The program prompts you to insert the remaining installation diskettes as needed. After the installation completes, press <Esc> to exit the installation program.

9. Modify the system settings as described previously.

Appendix H
Troubleshooting

This appendix addresses certain problems you may encounter when using the NI-VXI bus interface software on the VXIpc-486 platform. This material covers the following issues:

- Running the `VXIINIT` initialization program results in an error message.
- Running the `RESMAN` Resource Manager program causes the system to hang or results in incorrect data.
- The mouse (or other interrupt-driven device) behaves erratically after you install the NI-VXI software.

If you encounter any of these problems, your system may have a conflict with one of the VXIpc-486 configuration settings. For proper operation, the VXIpc-486 requires the allocation of the following system resources:

- One interrupt level that cannot be shared with another device
- Two blocks of memory space in the upper memory region of the PC AT

The following sections discuss each of these system requirements.

If you are unable to resolve your problem, please fill out the appropriate forms in Appendix I, *Customer Communication*, and contact National Instruments.

Problems with VXIINIT

This section discusses what to do if running the `VXIINIT` initialization program results in an error message.

VXIINIT Error Messages

`VXIINIT` can give you error messages that inform you that it did not recognize the VXIpc-486, that it could not find a specific file, or that an error occurred while writing a log file.

VXIINIT Determines that Machine is not a VXIpc-486

You can use the `VXIINIT` program on any VXIpc-486 in the Model 200 or Model 500 series. However, if you attempt to use a `VXIINIT` program distributed with the VXIpc-486 on another machine, such as a VXIpc-386, AT-MXI, or MC-MXI, you will receive an error message that reads **`Machine is not a VXIpc-486`**.

VXIINIT Could Not Find Specific Files

VXIINIT may inform you that it cannot find one or more of the configuration or table files, for example, **File VXILA.CFG not found.** Other files for which error messages are generated include VXIBUS.CFG, VXIDEV.CFG, DVXI.CFG, MFNAMEID.TBL, and MODEL.TBL. There are two possible causes for this error message.

1. The file(s) may have been deleted accidentally. If the file does not exist in your TBL directory after you installed your software, you can find it on your original NI-VXI distribution media and restore it manually.

2. The NIVXIPATH variable may be pointing to the wrong directory. The path should be set in the AUTOEXEC.BAT file to point to the root directory of the NI-VXI files. By default, this directory is C:\NIVXI.

Error Writing Log File

Another VXIINIT error message is **Error writing configuration to file.** This is only a warning message, and does not indicate a problem with the configuration. Either the log file could not be created, or only a partial log was written.

VXIINIT creates a file VXIINIT.OUT in the TBL subdirectory. This file is a text file that contains the same configuration information you see printed to the screen. The likely cause of this message is that the disk drive is full.

Problems with RESMAN

If the VXIINIT program runs successfully but you encounter problems with RESMAN, the Resource Manager program, the cause is probably the master-mode windows. The master-mode windows are two blocks of memory in the PC AT upper memory space that the VXIpc-486 uses to access the VXI/VME bus. The upper memory space of a PC AT is the region from 640 KB (A000h) to 1024 KB (FFFFh). Several system resources, such as system ROM and video memory, reside in this area. The VXIpc-486 uses the 32 KB region from C800h to CFFFh and the 64 KB region from E000h to EFFFh for master-mode VXI/VME accesses. These blocks of memory cannot be changed.

A conflict in the master-mode windows of the VXIpc-486 can cause RESMAN to behave erratically. The following are likely symptoms of a conflict with the master-mode windows.

- The RESMAN display shows multiple devices at Logical Address 0. (The VXIpc-486 should be the *only* device at Logical Address 0.)
- RESMAN detects nonexistent devices.
- The computer hangs when you run RESMAN.

The following paragraphs discuss the two main causes of a conflict with the master-mode windows.

Memory Area Used by Another Device

Your system may contain a device that occupies all or some of the upper memory area that is allocated for the master-mode windows.

To solve this problem, first determine what area of upper memory your devices use. Then move the conflicting device(s) to an unused area of upper memory.

If you have a Super VGA monitor, your system is likely to use video RAM. Generally, any video RAM used by your PC AT occupies all or some of the upper memory from A000h to BFFFh. If you have Ethernet networking cards, be aware that many of them occupy upper memory. Many Ethernet cards have an upper memory base address of D000h or E000h. Plug-in cards should use memory located between D000h and DFFFh.

Memory Area Used by Expanded-Memory Manager or Emulator

Your system may contain an expanded-memory manager or an expanded-memory emulator that uses a block of upper memory within the range that is allocated for the master-mode windows.

To solve this problem, verify which expanded-memory manager or emulator you are using, and prevent it from using upper memory within the address ranges for the master-mode windows. The following examples show how to prevent various expanded-memory managers or emulators from using upper memory within the address ranges for the master-mode windows, from C800h to CFFFh and E000h to EFFFh.

If you are using EMM386, which is included with MS-DOS, prevent it from using the address ranges for the master-mode windows by editing the `CONFIG.SYS` file and appending the flags `X=C800-CFFF` and `X=E000-EFFF` to the line `DEVICE=EMM386.EXE`.

If you are using QEMM386 from Quarterdeck, prevent it from using the address ranges for the master-mode windows by editing the `CONFIG.SYS` file and appending the flags `X=C800-CFFF` and `X=E000-EFFF` to the line `DEVICE=QEMM386.SYS`.

If you are using 386MAX from Qualitas, prevent it from using the address ranges for the master-mode windows by editing the `386MAX.PRO` file located in the `386MAX` directory, and inserting the lines `RAM=C800-CFFF` and `RAM=E000-EFFF`.

If you are using any other expanded-memory manager, refer to its documentation to learn how to prevent it from using the address ranges for the master-mode windows.

Problems with Mouse or other Interrupt-Driven Device

If your mouse appears to slow down system performance, add the `/y` option to your mouse command. This action switches off the hardware cursor and gives you full system performance.

As stated earier, the VXIpc-486 requires one interrupt line that it cannot share with another device in the system. The VXIpc-486 uses interrupt level 12 for VXI interrupts. Because only a serial mouse can be connected to to VXIpc-486, the interrupt levels of the COM ports will not conflict with VXI interrupts. However, other devices that are interrupt-driven may cause conflicts. If this is the case, change the interrupt level of the conflicting device to a different level (refer to Table F-3, *VXIpc-486 Interrupt Line Use*, in Appendix F, *VXIpc-486 Hardware Configuration*), because the VXI interrupt interrupt level cannot be changed.

Appendix I
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.

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Finland	90 527 2321	90 502 2930
France	1 48 65 33 00	1 48 65 19 07
Germany	089 7 14 50 93	089 7 14 60 35
Italy	02 48301892	02 48301915
Japan	03 3788 1921	03 3788 1923
Netherlands	01720 45761	01720 42140
Norway	03 846866	03 846860
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 27 00 20	056 27 00 25
U.K.	0635 523545	0635 523154
	or 0800 289877 (in U.K. only)	

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. Use additional pages if necessary.

Name _____

Company _____

Address _____

_____

Fax (___)_____ Phone (___)_____

The problem is _____

_____

_____

_____

_____

List any error messages _____

_____

_____

_____

_____

The following steps will reproduce the problem _____

_____

_____

_____

_____

Model 500 Series VXIpc-486 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

- Model 500 Series VXIpc-486 ID Label Information
  - Model Number _____ 500 _____ 566
  - Complete Part Number (including 3-digit suffix) _____
  - Serial Number _____
  - Revision Number _____
  - Fixed Disk Type (See ID label on module cover) _____
- Model 500 Series VXIpc-486 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

- Software Information
  - MS-DOS Version _____
  - NI-VXI for VXIpc-486 and MS-DOS Version _____
  - NI-488.2 Software for MS-DOS Version _____
- NI-VXI Software Configuration Information (see Chapter 4)
  - VXIla Configuration
    - Logical Address _____
    - Device Type _____
    - Address Space _____
    - VXI Shared RAM _____
    - Shared Memory Pool (Windows) _____
    - Slave Block Transfer Mode _____
    - Slave Supervisory Access Only _____
    - Resource Manager Delay (seconds) _____
  - VXIbus Configuration
    - Bus Request Level _____
    - Fair Requester Timeout (µs) _____
    - Bus Release Mechanism _____
    - Bus Arbitration _____
    - Local Bus Timeout (µs) _____
    - VXIbus Timeout _____
    - Bus Acquisition Time in Timeout _____
  - VXIdev Configuration
    - SYSRESET Resets PC _____
    - Use System Sanity Timer _____
    - Servant Area Size _____
    - Protocol Register _____
    - Read Protocols Response _____
    - Number of Handlers _____
    - Number of Interrupters _____

- Super VGA Option

  _____ Not Installed _____ Factory-Installed _____ User-Installed

  If installed, give the following information.

  System Settings Modified for Super VGA? _____

  Super VGA Option Selected _____

- Any Other Software In System _____

Other Products

- I/O Expansion Cards–VXIpc-486/2 or VXIpc-486/3 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)

_____

_____

_____

_____

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.

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Edition Date: **December 1993**

Part Number: **320522-01**

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.

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Glossary

Prefix	Meaning	Value
µ-	micro-	10^{-6}
m-	milli-	10^{-3}
k-	kilo-	10^{3}
M-	mega-	10^{6}
g-	giga-	10^{9}

Symbols

°	degrees
%	percent
Ω	ohms

A

A	amperes
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.
ANSI	American National Standards Institute
ASIC	Application Specific Integrated Circuit (a semi-custom chip)

B

B	bytes
backplane	An assembly, typically a printed circuit board, with 96-pin connectors and signal paths that bus the connector pins.

BIOS	Basic Input/Output System
block-mode transfer	An uninterrupted transfer of data elements in which the master sources only the first address at the beginning of the cycle. The slave is then responsible for incrementing the address on subsequent transfers so that the next element is transferred to or from the proper storage location.
BTO unit	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.
bus master	A device that is capable of requesting the Data Transfer Bus (DTB) for the purpose of accessing a slave device.
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

C	Celsius
CLK10	A 10 MHz, ± 100 ppm, individually buffered (to each module slot), differential ECL system clock that is sourced from Slot 0 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.
Commander	A Message-Based device which is also a bus master and can control one or more Servants.

D

DMA	Direct Memory Access
DRAM	Dynamic RAM (Random Access Memory); storage that the computer must refresh at frequent intervals.
dynamic configuration	A method of automatically assigning logical addresses to VXIbus devices at system startup or other configuration times.
dynamically configured device	A device that has its logical address assigned by the Resource Manager. A VXI device initially responds at Logical Address 255 when its MODID line is asserted. A MXIbus device responds at Logical Address 255 during a priority select cycle. The Resource Manager subsequently assigns it a new logical address, which the device responds to until powered down.

E

ECL	Emitter-Coupled Logic
EFD	External Floppy Disk
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.
EMI	electromagnetic interference
extended controller	A mainframe extender with additional VXIbus controller capabilities.
Extended Longword Serial	A form of Word Serial communication in which Commanders and Servants communicate with 48-bit data transfers.
external controller	In this configuration, a plug-in interface board in a computer is connected to the VXI mainframe via one or more VXIbus extended controllers. The computer then exerts overall control over VXIbus system operations.

F

fair requester	A MXIbus master that will not arbitrate for the MXIbus after releasing it until it detects the bus request signal inactive. This ensures that all requesting devices will be granted use of the bus.
FCC	Federal Communications Commission

G

GPIB	General Purpose Interface Bus; the industry-standard IEEE 488 bus.
GPIO	General Purpose Input/Output, a module within the National Instruments TIC chip. GPIOs are used for connecting external signals to the TIC chip for routing/conditioning to the VXIbus trigger lines.

H

Hz	hertz; events per second.

I

IEEE	Institute of Electrical and Electronics Engineers
in.	inches

I/O	input/output; the techniques, media, and devices used to achieve communication between entities.
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.
ISA	Industry Standard Architecture

K

KB	1,024 or 2^{10}; kilobytes of memory

L

LED	light emitting diode
logical address	An 8-bit number that uniquely identifies the location of a VXIbus device's configuration registers in a system. The A16 base address of a device is C000h + Logical Address * 40h.
Longword Serial	A form of Word Serial communication in which Commanders and Servants communicate with 32-bit data transfers instead of 16-bit data transfers as in the normal Word Serial Protocol.

M

MB	1,048,576 or 2^{20}; megabytes of memory
m	meters
master	A functional part of a MXI/VME/VXIbus device that initiates data transfers on the backplane. A transfer can be either a read or a write.
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.
MIGA	Message-Based Interface Gate Array; a proprietary National Instruments chip.
MODID	A set of 13 signal lines on the VXI backplane that VXI systems use to identify which modules are located in which slots in the mainframe.

N

NI-VXI	The National Instruments bus interface software for VME/VXIbus systems.
nonprivileged access	One of the defined types of VMEbus data transfers; indicated by certain address modifier codes. Each of the defined VMEbus address spaces has a defined nonprivileged access mode.

P

PC AT	Personal Computer Advanced Technology
PRI	Priority
privileged access	See *supervisory access*.

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.
RONR	Request On No Request
ROR	Release On Request; a type of VMEbus arbitration where the current VMEbus master relinquishes control of the bus only when another bus master requests the VMEbus.
RRS	Round Robin Select
RWD	Release When Done

S

s	seconds
Servant	A device controlled by a Commander.

statically configured device	A device whose logical address cannot be set through software; that is, it is not dynamically configurable.
supervisory access	One of the defined types of VMEbus data transfers; indicated by certain address modifier codes.
SYSCLK	System Clock Driver; a VMEbus functional module that provides a 16 MHz timing signal on the utility bus.
SYSFAIL	System Failure Driver; asserts a signal to indicate an internal failure.
SYSRESET	System Reset Driver; asserts a signal to indicate a system reset or power-up condition.
System Controller	A functional module that has arbiter, daisy-chain driver, and MXIbus cycle timeout responsibility.

T

TIC	Trigger Interface Chip; a proprietary National Instruments chip used for direct access to the VXI trigger lines. The TIC contains a 16-bit counter, a dual 5-bit tick timer, and a full crosspoint switch.
trigger	Either TTL or ECL lines used for intermodule communication.
tristated	Defines logic that can have one of three states: low, high, and high-impedance.
TTL	Transistor-Transistor Logic

V

V	volts
VDC	volts direct current
VIC	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.
VICTEXT	Text-based VXI Interactive Control program, functionally equivalent to VIC.
VME	Versa Module Eurocard or IEEE 1014
VXIbus	VMEbus Extensions for Instrumentation

VXIINIT	A program in the NI-VXI bus interface software package that initializes the board interrupts, shared RAM, VXI register configurations, and bus configurations. This program must be run at least once after rebooting your machine to initialize the system.
VXIEDIT	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.
VXITEDIT	Text-based VXI Resource Editor program, functionally equivalent to VXIEDIT.

W

W	watts
Word Serial Protocol	The simplest required communication protocol supported by Message-Based devices in the VXIbus system. It utilizes the A16 communication registers to transfer data using a simple polling handshake method.

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