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Getting Started with Your VXIpc™-486 Model 500 Series



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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'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère 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. The Model 500 Series consists of the VXIpc-486 Models 500, 566, and 599 computers.

Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, describes the VXIpc-486 Model 500 Series embedded computer, lists what you need to get started, and lists optional equipment and software.
- Chapter 2, *VXIpc-486 Configuration and Installation*, describes how to configure and install the VXIpc-486 Model 500 Series embedded computer.
- Chapter 3, *BIOS Setup*, describes how to set up the basic input/output system (BIOS) for the VXIpc-486 Model 500 Series computer.
- Appendix A, *National Instruments Software*, summarizes the National Instruments software products you can use with your VXIpc-486 Model 500 Series computer.
- Appendix B, *Specifications*, lists various module specifications of the VXIpc-486 Model 500 Series computer, such as physical dimensions and power requirements.
- Appendix C, *Front Panel Indicators*, describes the functions of the seven front panel LED indicators on the VXIpc-486 Model 500 Series computer.
- Appendix D, *Connectors*, describes the front panel and VXIbus connector pinouts on the VXIpc-486 Model 500 Series computer.
- Appendix E, *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 VXIpc-486/2 Model 500 Series computer equipped with the I/O expansion kit.
- Appendix F, *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 G, *VXIpc-486 Hardware Configuration*, contains hardware configuration information about the VXIpc-486 Model 500 Series computer regarding memory map locations, I/O address map locations, interrupt lines, and DMA channels.
- Appendix H, *Configuring the Super VGA Option*, describes the Super VGA (video graphics adapter) driver option you can use with your VXIpc-486 Model 500 Series computer and contains instructions for configuring your system to use this option.

- Appendix I, *Common Questions*, answers common questions you may have when using the NI-VXI bus interface software on the VXIpc-486 platform.
- Appendix J, *Troubleshooting*, addresses system-related problems you may encounter when using the NI-VXI bus interface software on the VXIpc-486 platform.
- Appendix K, *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.
- The *Index* contains an alphabetical list of key terms and topics in this manual, including the page where you can find each one.

Conventions Used in This Manual

The following conventions are used in this manual.

bold	Bold text denotes menus, menu items, LEDs, dialog box buttons, and options.
italic	Italic text denotes emphasis, a cross reference, or an introduction to a key concept.
bold italic	Bold italic text denotes a note, caution, or warning.
`monospace`	Text in this font denotes the proper names of disk drives, paths, directories, programs, subprograms, filenames, and extensions.
`bold monospace`	Bold text in this font denotes the messages and responses that the computer automatically prints to the screen.
Model 500 Series	The term *Model 500 Series* is used in this manual to refer to the VXIpc-486 Models 500, 566, and 599 embedded computers. When there are any differences among the three models, this manual describes them specifically.
<>	Angle brackets enclose the name of a key on the keyboard—for example, <Esc>.
<Tab>	Key names are capitalized.

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

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
- VXI-6, *VXIbus Mainframe Extender Specification*, Rev. 1.0, VXIbus Consortium

Customer Communication

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

Chapter 1
Introduction

This chapter describes the VXIpc-486 Model 500 Series embedded computer, lists what you need to get started, and lists optional equipment and software.

The VXIpc-486, an embedded computer based on the Industry Standard Architecture (ISA), is a high-performance, easy-to-use platform for VXIbus systems, featuring complete VXI functionality through interactive utilities and C function calls. In addition, the VXIpc-486 has an IEEE 488 interface that is compatible with the NI-488.2 architecture.

This manual describes VXIpc-486 Models 500, 566, and 599 as the Model 500 Series. The major difference in the three models is the type and speed of the microprocessor.

- The Model 500 uses the 50 MHz version of the Intel 80486DX2 microprocessor.
- The Model 566 uses the 66 MHz version of the Intel 80486DX2 microprocessor.
- The Model 599 uses the 100 MHz version of the Intel 80486DX4 microprocessor.

What You Need to Get Started

❑ VXIpc-486 Model 500 Series Module (one of the following):
  Model 500 one-slot (with onboard video)
  Model 500 two-slot (with or without onboard video)
  Model 566 one-slot (with onboard video)
  Model 566 two-slot (with or without onboard video)
  Model 599 one-slot (with onboard video)
  Model 599 two-slot (with or without onboard video)

❑ Keyboard adapter cable

Optional Equipment

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

- VXIpc-EFD external 3.5 in. floppy drive (compatible with models without an internal floppy drive)
- COM2 adapter cable
- I/O expansion slot panel bracket, blank
- Type X1 single-shielded GPIB cables (1 m, 2 m, or 4 m)
- Type X2 double-shielded GPIB cables (1 m, 2 m, or 4 m)

Optional Software

National Instruments offers several software products that are compatible with the VXIpc-486 Series computers. These products include the NI-VXI bus interface software, which you can use to program VXI directly, and the NI-488.2 software, which you can use to control external GPIB instruments from your VXIpc-486. Also available are VXI Software Development Systems for LabVIEW for Windows, LabWindows® for DOS, and LabWindows/CVI. For more information on software available from National Instruments, refer to Appendix A, *National Instruments Software*.

You can also order the Super VGA video option for your VXIpc-486 Model 500 Series. The Super VGA option is compatible with DOS and with Windows 3.1 or above. 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 H, *Configuring the Super VGA Option*. This appendix also includes installation instructions in case you order this option at a later date.

Hardware Description

The VXIpc-486 Series computers are custom VXI computers that you install directly in your VXI mainframe to achieve the smallest possible physical size for a VXI system. An embedded computer can take full advantage of the VXI high-performance backplane capabilities and give you direct control of VXI registers, memory, and triggers.

The VXIpc-486 computers are available in one-slot and two-slot versions. 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 is available in various combinations of internal hard disk drive, internal floppy disk drive, and PC-compatible I/O expansion kits. The optional external floppy drive is compatible with VXIpc-486/1 and VXIpc-486/2 models without an internal floppy drive.

All models have connectors for an external floppy drive, a VGA or Super VGA monitor, a GPIB interface, serial and parallel ports, and VXI clock and trigger signals.

Chapter 2
VXIpc-486 Configuration and Installation

This chapter describes how to configure and install the VXIpc-486 Model 500 Series embedded computer.

Note: ***This chapter discusses the VXIpc-486 Models 500, 566, and 599 together as the Model 500 Series. The illustrations in this chapter apply to all models in the series.***

Factory Configuration

The VXIpc-486 Model 500 Series is factory-configured to function as a VXIbus Slot 0 System Controller. This is the most commonly used configuration. Table 2-1 shows the details of the factory configuration.

Table 2-1. VXIpc-486 Model 500 Series 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.

Configuring the VXIpc-486

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

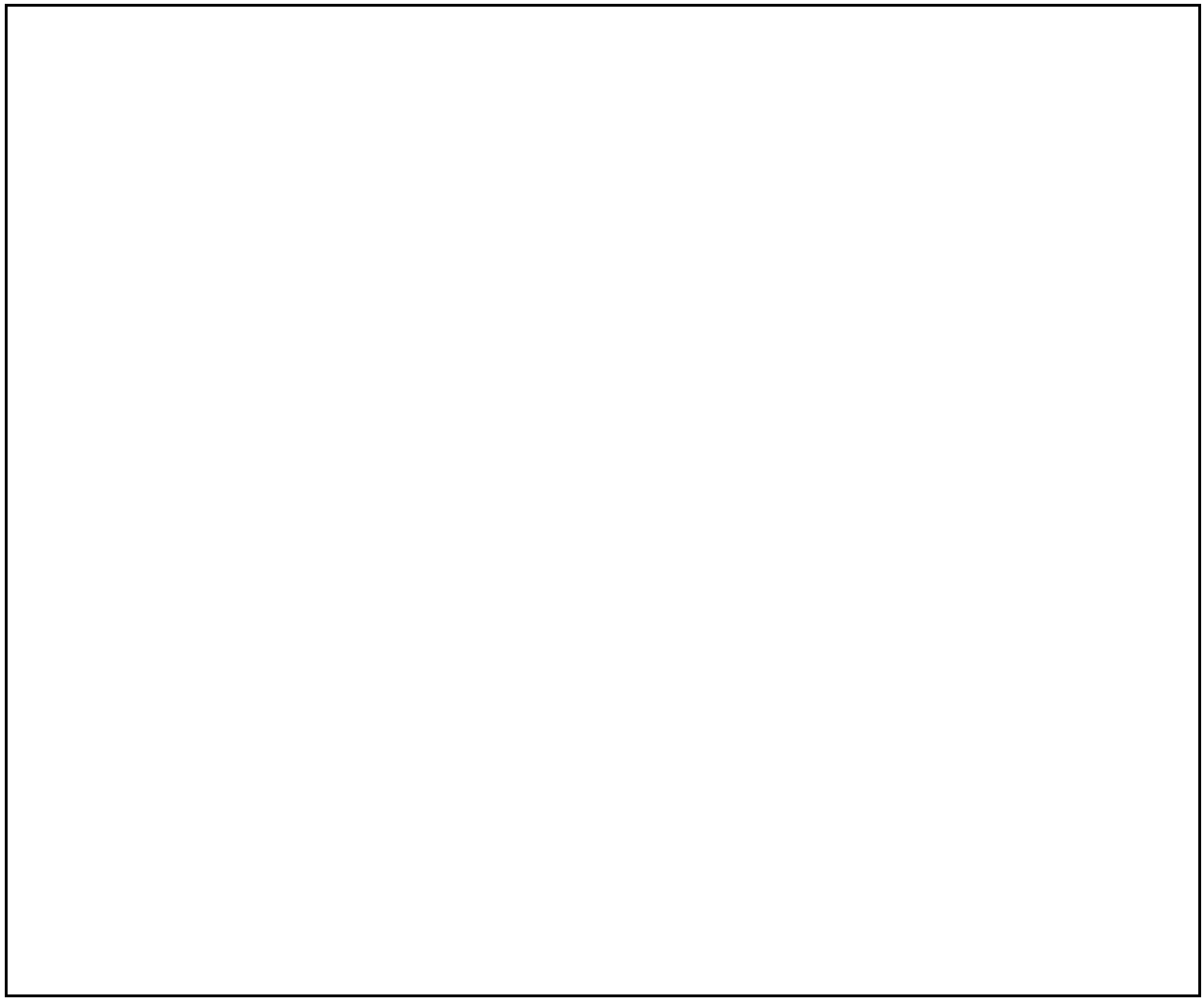


Figure 2-1. VXIpc-486 Model 500 Series Parts Locator Diagram (Continues)

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.

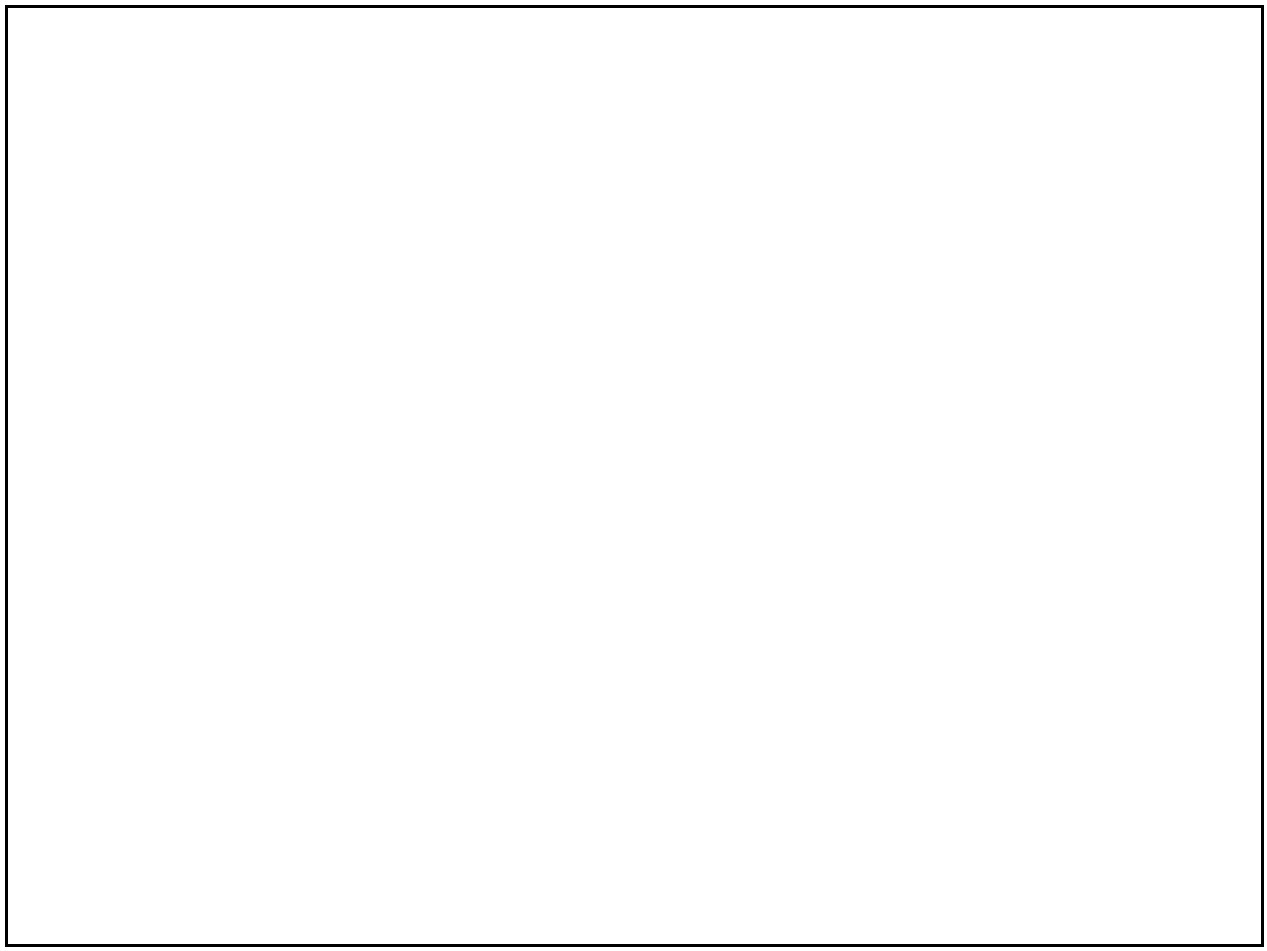


Figure 2-1. VXIpc-486 Model 500 Series Parts Locator Diagram (Continued)

Configuration Options

Figure 2-1 shows the location of the VXIpc-486 Model 500 Series 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

Slot 0 Configurations

Configurations A through D from Table 2-2 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 VXIpc-486 Model 500 Series. 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.

Non-Slot 0 Configurations

If you will be installing the VXIpc-486 Model 500 Series in any slot other than Slot 0, use either configuration E or F from Table 2-2. As a Non-Slot 0 device, the VXIpc-486 accepts the CLK10 signal from the backplane.

- In configuration E, the VXIpc-486 Model 500 Series 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.

MODID Signal Termination

W26 configures the MODID signal termination for Slot 0/Non-Slot 0 operation. In the default configuration 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 an 825 Ω pull-down resistor.

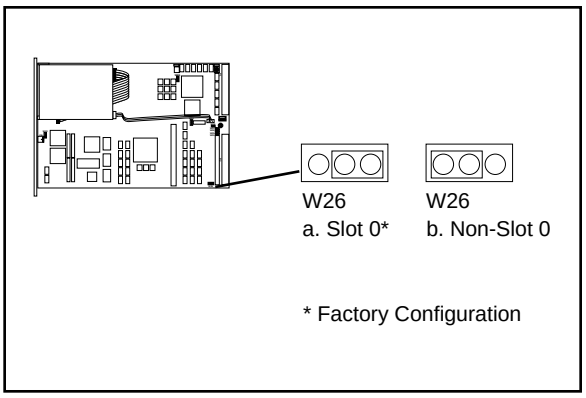


Figure 2-2. MODID Signal Termination Settings

System Controller

W25 configures the System Controller for Slot 0/Non-Slot 0 operation. In the default configuration for Slot 0 operation (Figure 2-3a), W25 enables the VXIpc-486 Model 500 Series 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.

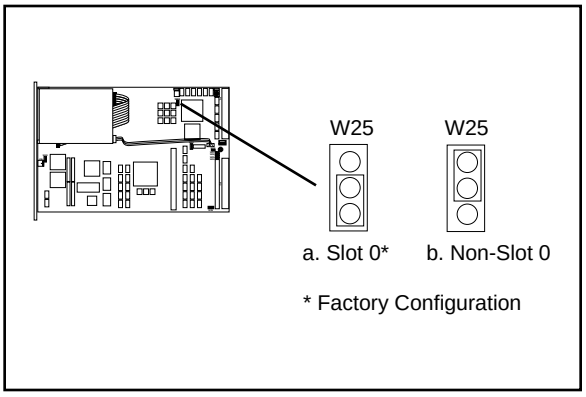


Figure 2-3. System Controller Settings

CLK10 Generation

W24 configures the receiving source for the CLK10 reference. For internal clock generation, leave the jumper in the default position as shown in Figure 2-4a. When the source is from the CLK10 SMB connector 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.

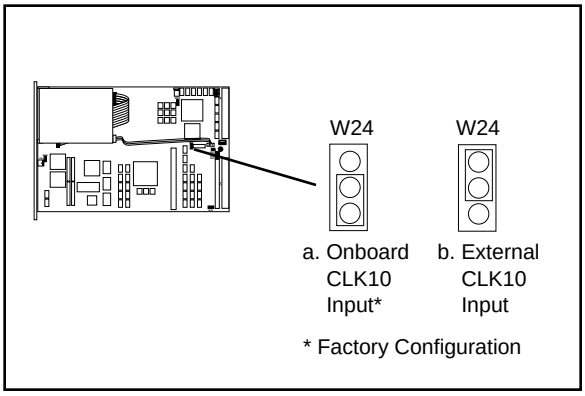


Figure 2-4. CLK10 Generation Settings

VXIbus CLK10

This jumper block configures the CLK10 transceivers. Figure 2-5(a) shows the default Slot 0 configuration in which the VXIpc-486 sources the CLK10 signal. If you want to configure the VXIpc-486 as a Non-Slot 0 device, you should choose the setting in Figure 2-5(b). In this configuration, the VXIpc-486 does not drive the CLK10 signal onto the bus.

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.***

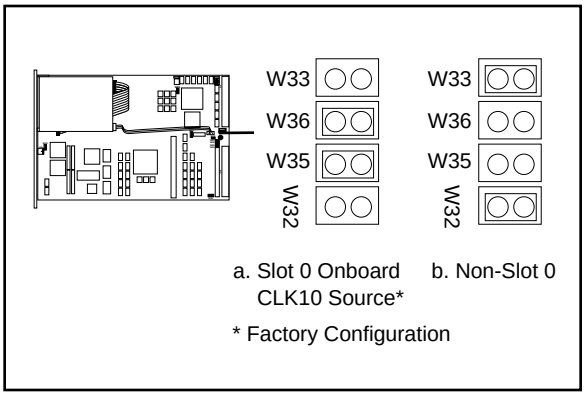


Figure 2-5. VXIbus CLK10 Settings

External CLK10

The W20 jumper configures the CLK SMB connector on the front panel. Keep the default configuration shown in Figure 2-6(a) if the CLK connector is disconnected and used as neither an input nor an output for the CLK10 signal. Figure 2-6(b) shows the configuration to use if you want the CLK10 signal that appears on the backplane to also appear on the CLK SMB connector. The configuration in Figure 2-6(c) is useful only if you have configured the W24 jumper to use the external CLK10 input. In this setting, the signal supplied to the CLK SBM connector is driven onto the VXIbus backplane as CLK10.

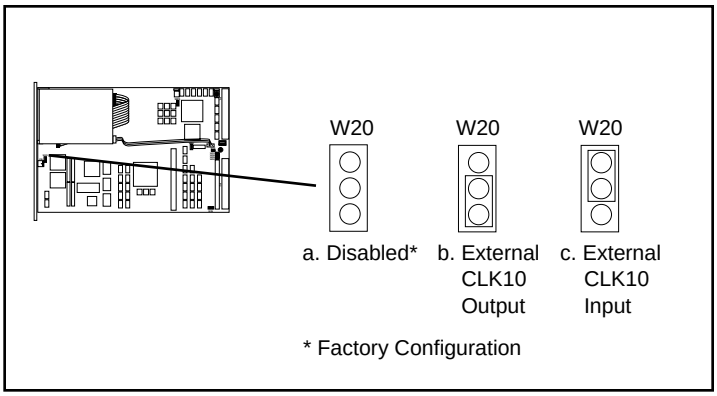


Figure 2-6. External CLK10 Settings

External CLK10 Termination

The J16 jumper configures whether the CLK10 signal is terminated. This is important only if you are daisy-chaining the CLK10 signal among multiple chassis. The source of the CLK10 and the last chassis in the daisy-chain should be terminated to prevent electrical reflections. Notice that this option is useful only if you have selected the external CLK by jumpers W20 and W24.

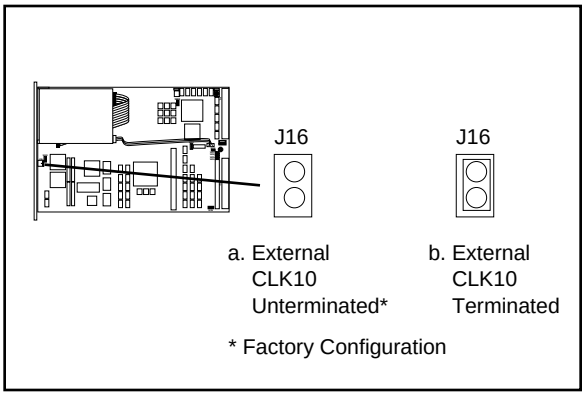


Figure 2-7. External CLK10 Termination Settings

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.

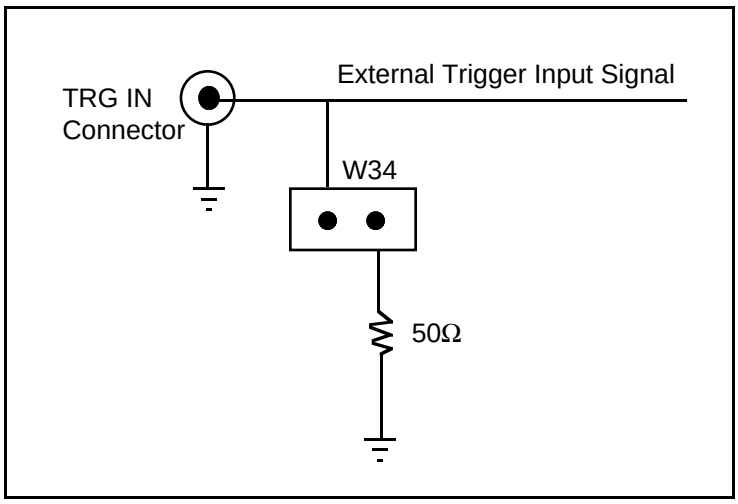


Figure 2-8. External Trigger Input Circuit

The W34 jumper configures whether the external TTL trigger input is terminated with a 50 Ω resistor to ground. This is important only if you are daisy-chaining the external trigger input among multiple chassis. The source of the trigger input and the last chassis in the daisy-chain should be terminated to prevent electrical reflections. Figure 2-9 shows the external trigger input termination settings.

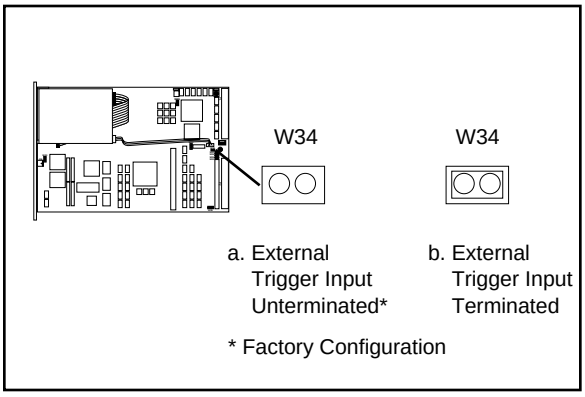


Figure 2-9. External Trigger Input Termination Settings

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 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 the VXIpc-486/2. 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 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 VXIpc-486 Model 500 Series. 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 D, *Connectors*, for pinout details about each connector.

1. Turn off the mainframe power.

   Warning: ***Installing a VXIpc-486 Model 500 Series 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 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` is run. See Appendix C, *Front Panel Indicators*, for more information about the front panel LED operation.

Figure 2-10 shows the front panel of a two-slot VXIpc-486 equipped with the floppy drive option.

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

Chapter 3
BIOS Setup

This chapter describes how to set up the basic input/output system (BIOS) for the VXIpc-486 Model 500 Series computer. The VXIpc-486 uses the Quadtel AT Compatible Enhanced BIOS. The BIOS defines the way in which software interacts with the 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.

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 s
Keyboard Rate	13/s
Numlock Boot State	Auto

Appendix A
National Instruments Software

This appendix summarizes the National Instruments software products you can use with your VXIpc-486 Model 500 Series computer. The VXIpc-486 uses NI-VXI and NI-488.2 software for DOS, Windows, Windows NT, and UNIX. The application software LabVIEW and LabWindows can also run on the VXIpc-486.

NI-VXI

The VXIpc-486 Series computers are compatible with numerous software packages and tools available for general-market computers. To program VXI directly, you can use the NI-VXI bus interface software available from National Instruments. The NI-VXI software for the VXIpc-486 includes a Resource Manager, an interactive VXI resource editor program, a comprehensive library of software routines for VXI/VME programming, and an interactive control program for interacting with the VXIbus. You can use this software to program multiple-mainframe configurations seamlessly and have software compatibility across a variety of VXI/VME controller platforms. You can use the same software with the Model 200 Series. NI-VXI software for the VXIpc-486 is available for the following platforms:

- DOS
- Windows
- Windows NT
- UNIX

NI-488.2

The NI-488.2 software kit for the VXIpc-486 gives you accessibility to the industry-standard NI-488.2 software for controlling external GPIB instruments through the GPIB port on the front panel of your VXIpc-486. The GPIB interface on the VXIpc-486 is fully compatible with the NI-488.2 driver for a variety of operating systems. NI-488.2 software for the VXIpc-486 is available for the following platforms:

- DOS
- Windows
- Windows NT
- UNIX

LabVIEW and LabWindows

If you want to use LabVIEW with your VXIpc-486, you can order the LabVIEW for Windows VXI Development System. If you want to use LabWindows with your VXIpc-486, you can order either the LabWindows for DOS VXI Development System or the LabWindows/CVI for Windows VXI Development System.

LabVIEW is a graphical programming system for data acquisition and instrument control. With LabVIEW, you can create software modules called virtual instruments (VIs) instead of writing programs. The LabVIEW VXI Development System for the VXIpc-486 features fully integrated VXI capability and an extensive library of complete, high-level instrument drivers for popular GPIB and VXI instruments. LabVIEW is available for Windows and Windows NT platforms for the VXIpc-486.

LabWindows is a DOS-based integrated software system for rapid development, prototyping, and operation of test and measurement applications. You can develop, debug, and execute your application directly in the LabWindows environment, or you can use the extensive LabWindows libraries and instrument drivers that are included with the package to build stand-alone applications using Microsoft QuickBASIC or C, Borland C/C++, or Visual Basic for DOS.

LabWindows/CVI is a full-function, interactive C programming environment and compiler for Windows. LabWindows/CVI combines the intuitive graphical user interfaces (GUIs) from the Windows platform with the necessary tools for data acquisition and control, data analysis, and data presentation to give you an integrated system for developing instrumentation software.

Appendix B
Specifications

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

CPU

Microprocessor	50 MHz 80486DX2 (Model 500) 66 MHz 80486DX2 (Model 566) 100 MHz 80486DX4 (Model 599)
RAM	4, 5, 8, 16, or 32 MB
Hard Disk Options	80, 127, 220, 240, 525, or 1050 MB

Physical

C-size VXIbus Module

Slot Requirements	486/1: one slot 486/2: two 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
- Keyboard
- COM1
- COM2

- LPT
- External Floppy Disk (EFD)
- IEEE 488
- CLK10 I/O
- Trigger Input
- Audio/Trigger Output

Power Requirements

Source	1-Slot Module Direct Current (max)	Dynamic Current (max)	2-Slot Module 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, maximum	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
- Multi-mainframe 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 C
Front Panel Indicators

This appendix describes the functions of the seven front panel LED indicators on the VXIpc-486 Model 500 Series computer. 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 and the green **TEST** and **ON LINE** LEDs indicate the status of the VXIpc-486. The status LED indications are shown in Table C-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 C-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.

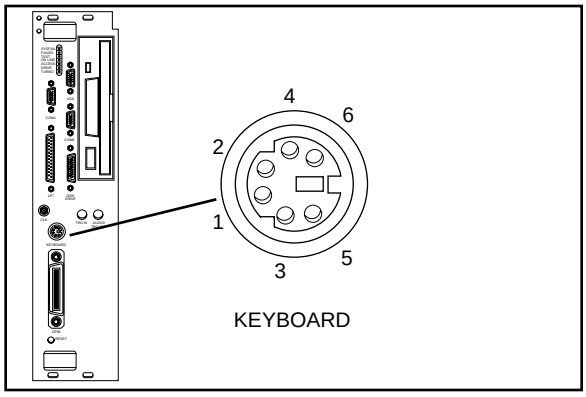
The green **TURBO** light is not used and is never lit on the VXIpc-486 Model 500 Series computer.

Appendix D
Connectors

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

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



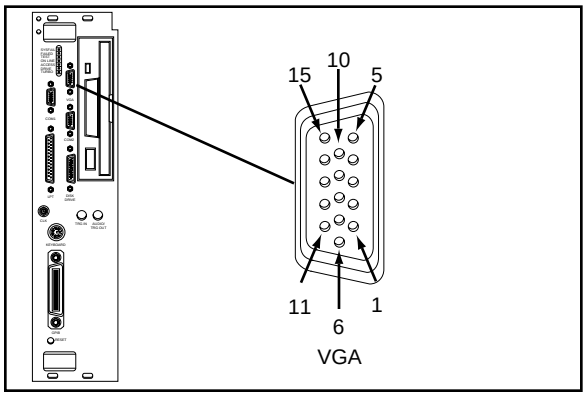
Connector Type:
6-pin Mini DIN

Figure D-1. KEYBOARD Connector

Table D-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



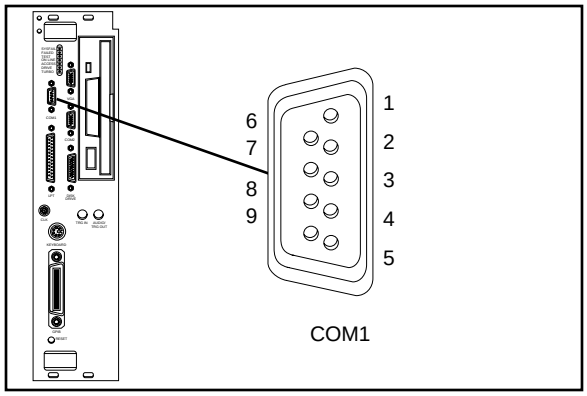
Connector Type:
15-pin Subminiature
DHD-22

Figure D-2. VGA Connector

Table D-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



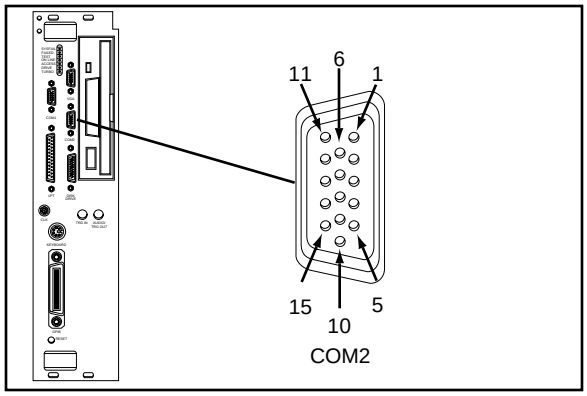
Connector Type:
9-pin Subminiature
DHD-20

Figure D-3. COM1 Connector

Table D-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 D-4. COM2/GPIO Connector

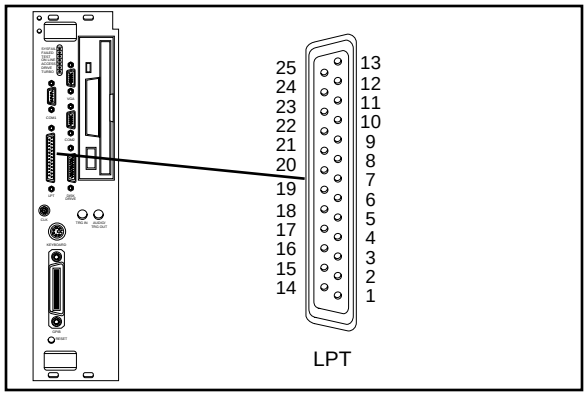
Table D-4a. COM2/GPIO Connector COM2 Signals

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

Table D-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



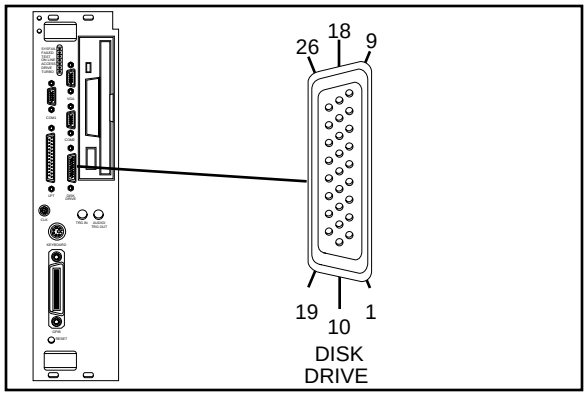
Connector Type:
25-pin Subminiature
DHD-20

Figure D-5. LPT Connector

Table D-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



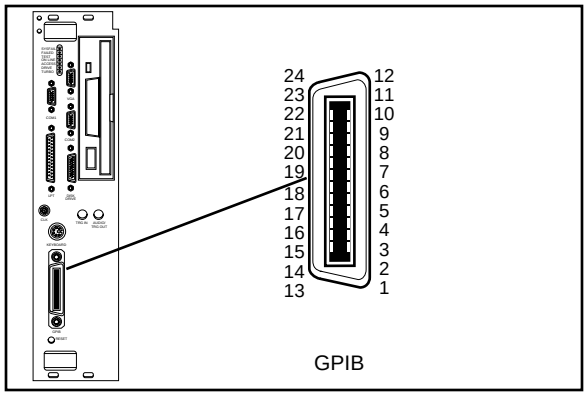
Connector Type:
26-pin Subminiature
DHD-22

Figure D-6. DISK DRIVE Connector

Table D-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



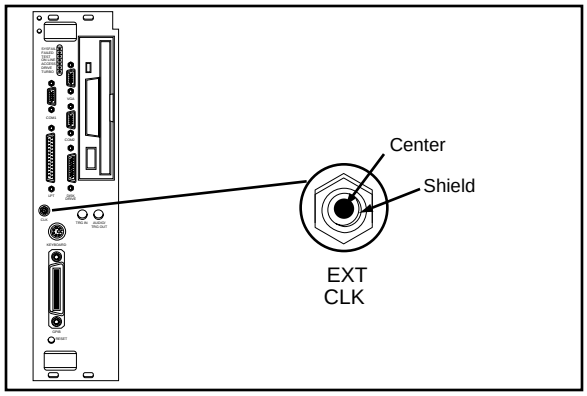
Connector Type: GPIB

Figure D-7. GPIB Connector

Table D-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



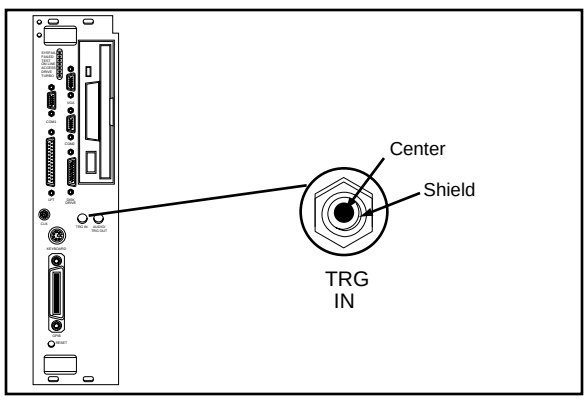
Connector Type: SMB

Figure D-8. EXT CLK Connector

Table D-8. EXT CLK Connector Signals

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

External Trigger Input



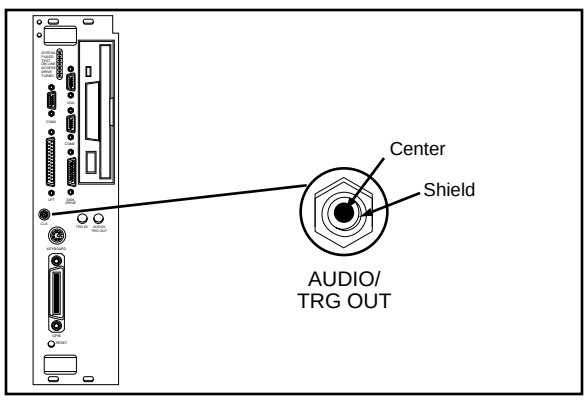
Connector Type: SMB

Figure D-9. TRG IN Connector

Table D-9. TRG IN Connector Signals

Pin	Signal Description
Center	Trigger Input Signal
Shield	Ground

External Audio/Trigger Output



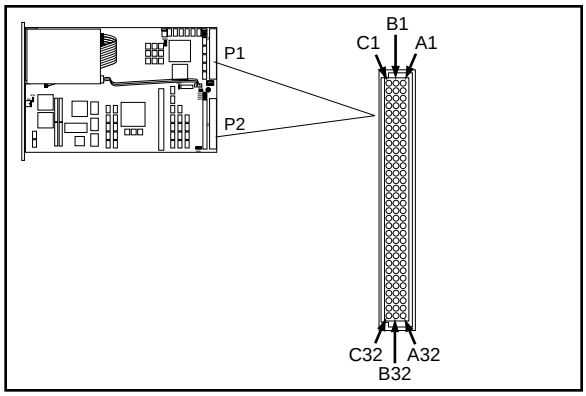
Connector Type: SMB

Figure D-10. AUDIO/TRG OUT Connector

Table D-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 D-11. VXIbus Connector

Table D-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 D-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 D-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 E
Modifying and Installing I/O Expansion Boards

This appendix explains how to modify and install commercially available PC/XT and PC AT I/O boards in a VXIpc-486/2 Model 500 Series computer equipped with the I/O expansion kit.

Some VXIpc-486/2 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 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

Alternately, you can modify the blank panels provided with the VXIpc-486/2. Blank panels are also available from National Instruments as an accessory (part number 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. Part number 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 F
VXIpc-486 Plug-in Boards

This appendix discusses several considerations with regard to the height and length of plug-in boards used in an expansion kit for the VXIpc-486.

The VXIpc-486 Model 500 Series computer has several configurations that include an expansion kit for installing plug-in boards. There are considerations for these plug-in boards that may be a bit confusing. The information in this appendix is 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 F-1.

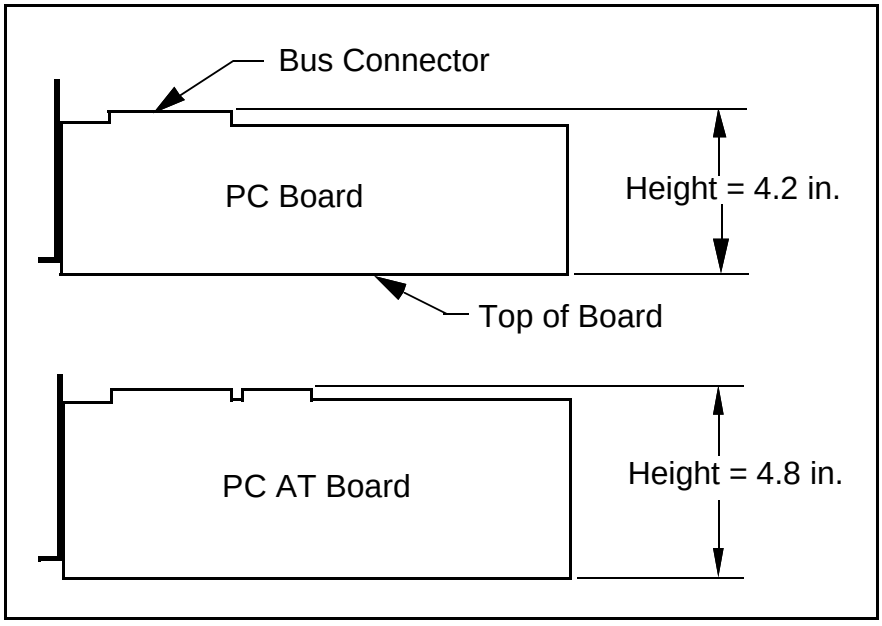


Figure F-1. Height Comparison of PC Boards Versus PC AT Boards

As Figure F-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 F-2 shows how PC-height boards are installed in the VXIpc-486 expansion kit for the Model 500 Series.

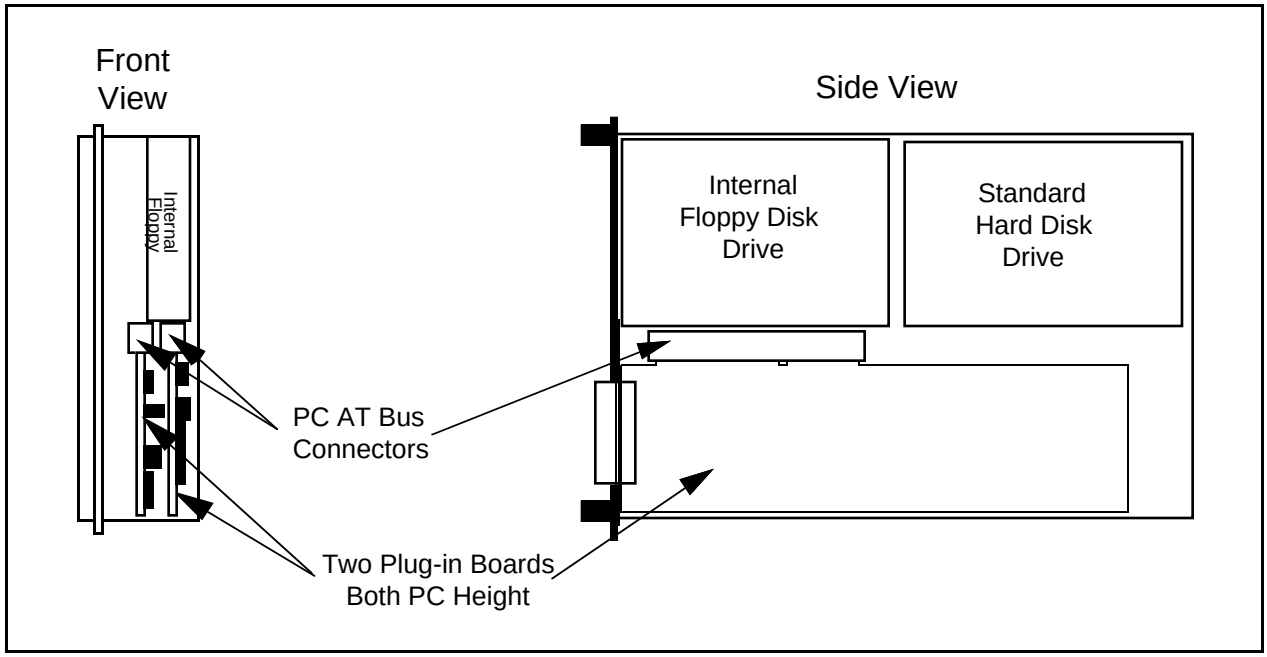


Figure F-2. Installing PC-Height Boards in a VXIpc-486 System

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 F-3. From the front view, the leftmost plug-in board (the first one installed) must still be PC-height, while the rightmost board (the 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.

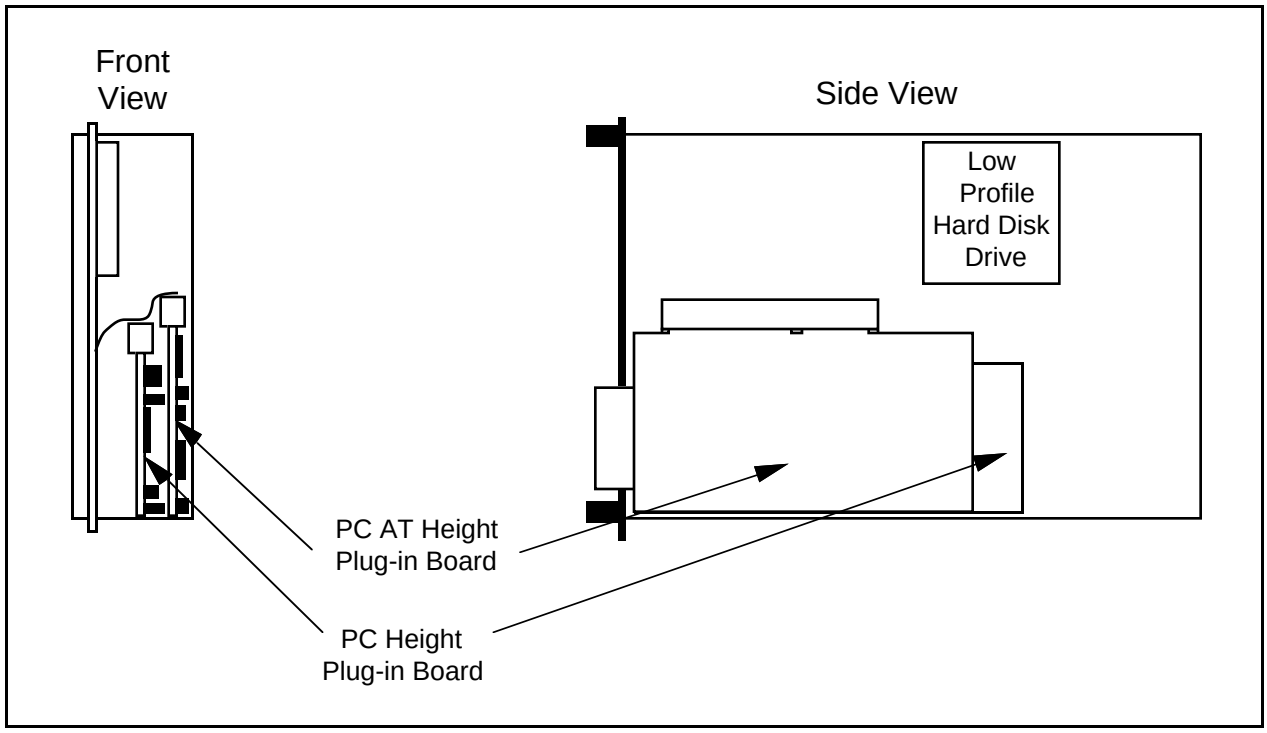


Figure F-3. Installing PC AT-Height Boards in a VXIpc-486 System

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 VXIpc-486 Model 500 Series computer. 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 F-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 F-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.

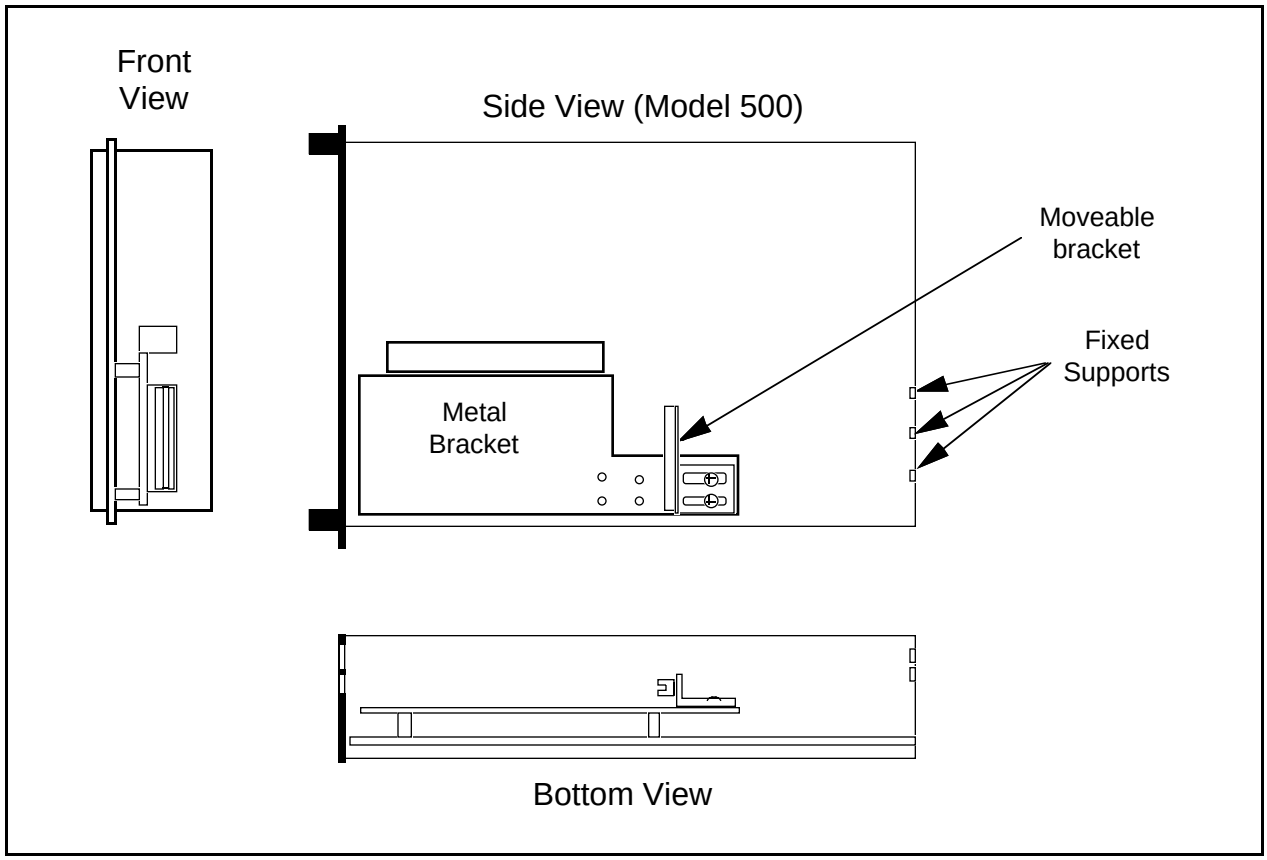


Figure F-4. VXIpc-486 Expansion Kit with No Boards Installed

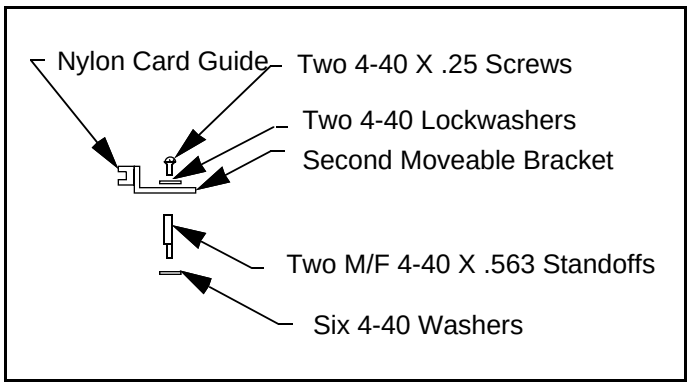


Figure F-5. Kit Number 776713-02 for Two-Board Expansion (Model 500 Series)

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 F-6.

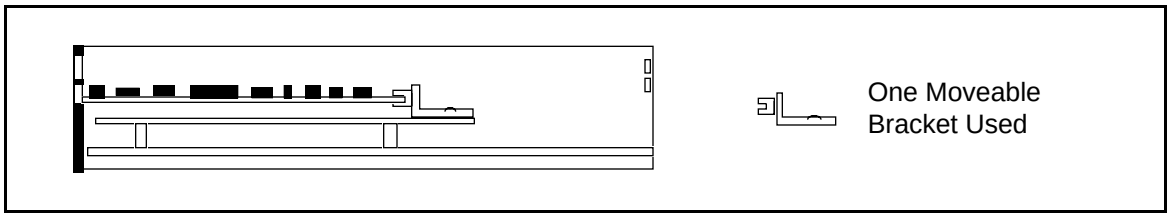


Figure F-6. First Board 8.2 in. Long or Less

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 F-7). This may not be an issue in some applications, but if the application requires rugged handling, it may be inadvisable to install the board without a support.

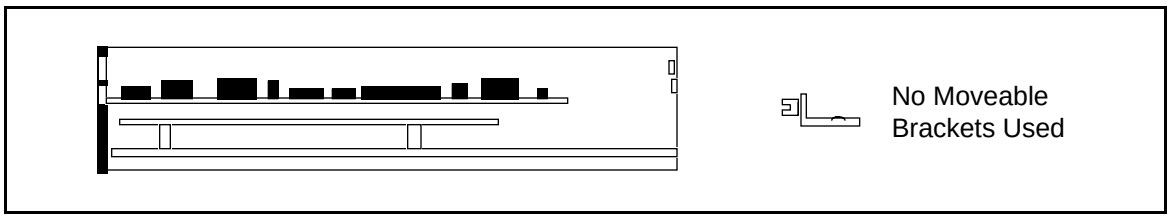


Figure F-7. First Board between 8.2 in. and 13.4 in. Long

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 F-8 and F-9 show configurations that require the use of both brackets.

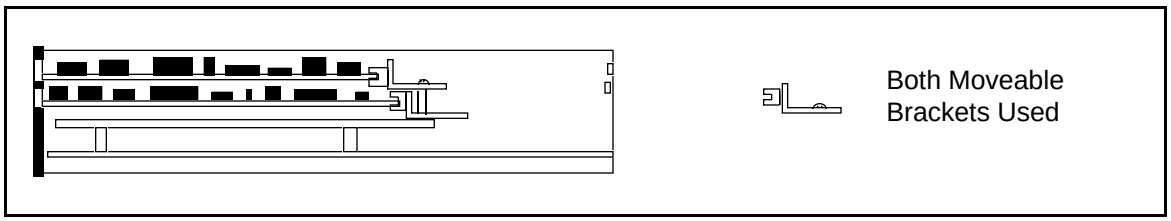


Figure F-8. Both Boards 8.2 in. Long or Less

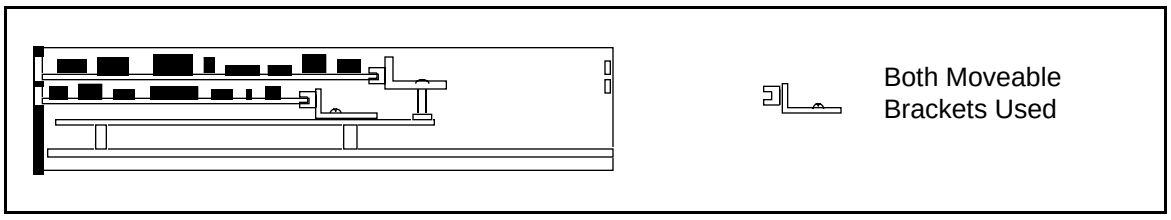


Figure F-9. First Board Less than 8.2 in. Long,
Second Board 8.2 in. Long or Less, but Longer than the First Board

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 F-10. Remember that PC AT-height boards can be used in the second expansion slot only.

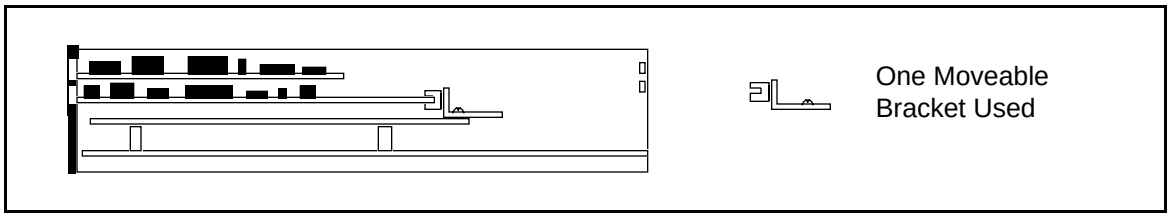


Figure F-10. First Board 8.2 in. Long or Less,
Second Board over One Inch Shorter than First Board

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 requires rugged handling, it may be inadvisable to install the board without a support. Figures F-11 and F-12 show two examples in which the second board is unsupported because it is between 8.2 in. and 13.4 in. long.

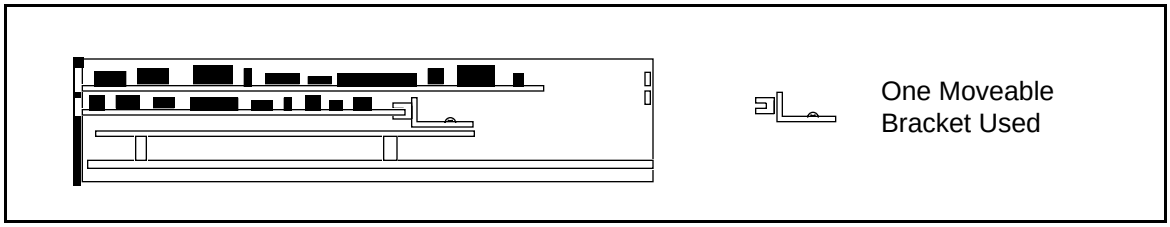


Figure F-11. First Board 8.2 in. Long or Less,
Second Board between 8.2 in. and 13.4 in. Long

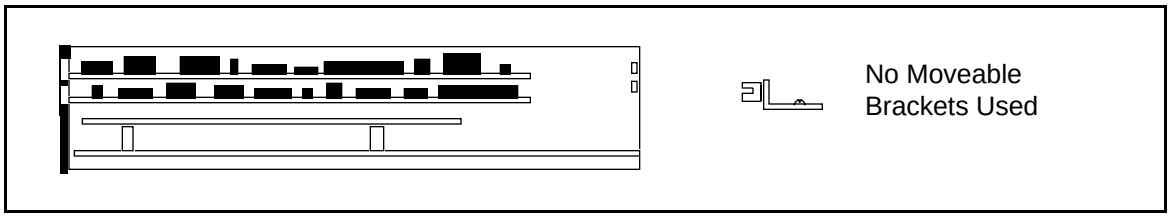


Figure F-12. Both Boards Between 8.2 in. and 13.4 in. Long

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

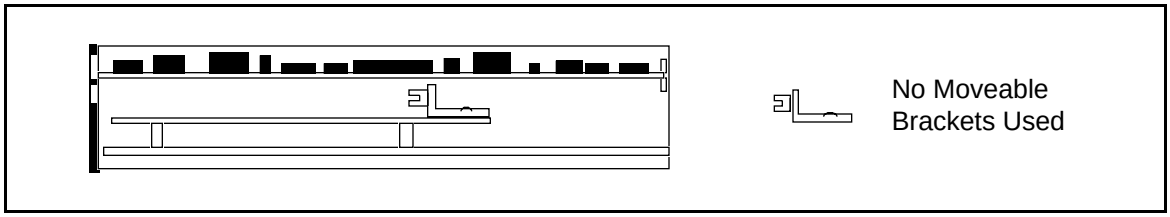


Figure F-13. Second Board Full 13.4 in. Long

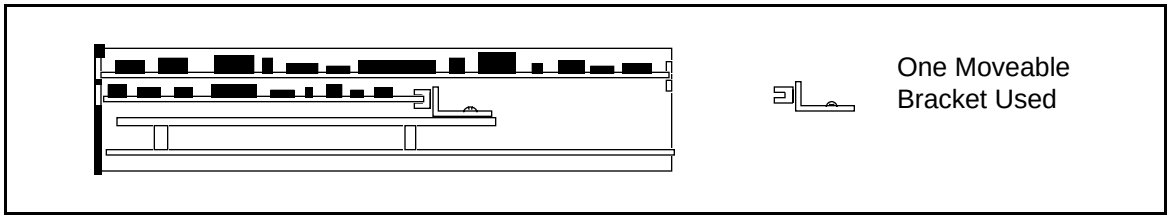


Figure F-14. First Board 8.2 in. Long or Less,
Second Board Full 13.4 in. Long

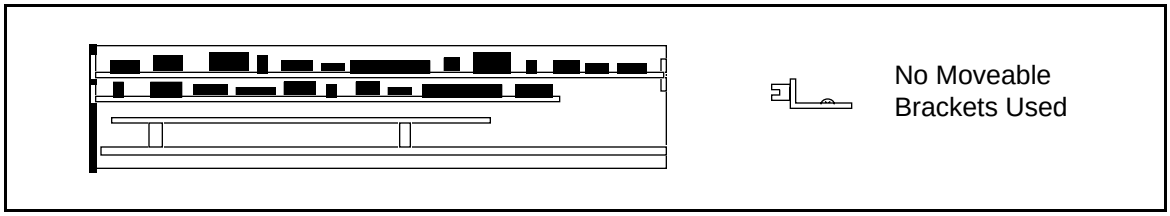


Figure F-15. First Board between 8.2 in. and 13.4 in. Long,
Second Board Full 13.4 in. Long

Appendix G
VXIpc-486 Hardware Configuration

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

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

Introduction

This appendix describes the Super VGA (video graphics adapter) driver option you can use with your VXIpc-486 Model 500 Series computer and contains instructions for configuring your computer to use this option.

The Super VGA option is compatible with DOS and with Windows 3.1 and above. 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 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 VXIpc-486 Model 200 Series computers.

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 VXIpc-486 after the Super VGA option is installed.

* **CHIPS 452 VGA 640x480 256 Color**
  This option changes the default of 16 colors to 256 colors. The resolution remains at 640 by 480 pixels.

* **CHIPS 452 VGA 800x600 16 Color**
  This option increases the resolution to 800 by 600 pixels. The color option remains at 16 colors.

* **CHIPS 452 VGA 1024x768 16 Color**
  This option increases the resolution to 1024 by 768 pixels. The color option remains at 16 colors.

4. Highlight the Super VGA option you want to use and click 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 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 I
Common Questions

This appendix answers common questions you may have when using the NI-VXI bus interface software on the VXIpc-486 platform. This material does not cover problems that you may have with the system. Please see Appendix J, *Troubleshooting*, if you have system-related problems.

What do the LEDs on the front of the VXIpc-486 mean?

- The **SYSFAIL** light shows the state of the VXIbus SYSFAIL line. This line is asserted whenever any device in the chassis has not yet passed its self-test, failed its self-test, or has detected a failure after originally passing its self-test.
- The **FAILED** light indicates whether the VXIpc-486 has passed its own self-test.
- The **TEST** light indicates that the Resource Manager has not yet run and verified the VXIpc-486. The **TEST** light will go off when the test is complete, and the **ON LINE** light will come on.
- The **ON LINE** light means that the VXIpc-486 is ready for operation across the VXIbus.
- The **ACCESS** light indicates whether the VXIpc-486 is currently accessing the VXIbus.
- The **DRIVE** light indicates whether the hard disk is being accessed.
- The **TURBO** light is not used by the VXIpc-486 Model 500 series.

Refer also to Appendix C, *Front Panel Indicators*.

Is there something wrong with the VXIpc-486 if the red SYSFAIL and FAILED LEDs stay lit after booting the VXIpc-486?

Most likely, the VXIpc-486 has not yet run the hardware initialization program, `VXIINIT`. After it runs this program successfully, the **FAILED** LED should definitely turn off and, if no other devices are asserting the backplane SYSFAIL line, the **SYSFAIL** LED should also turn off. Perform the following procedure if either the **SYSFAIL** or **FAILED** LED remains lit.

1. Power off the mainframe.
2. Remove all other modules from the mainframe.
3. Make sure that the VXIpc-486 jumper settings are set correctly.

4. Make sure that the VXIpc-486 is seated properly in the mainframe.

5. Power on the mainframe and observe whether the **SYSFAIL** and **FAILED** LEDs become unlit after running `VXIINIT`.

Refer also to Appendix C, *Front Panel Indicators*.

Why is the TURBO light never lit on the VXIpc-486 Model 500 Series?

The **TURBO** light is never lit on the VXIpc-486 Model 500 Series because models in this series do not have a TURBO or *enhanced* CPU speed. The Model 500 Series computers are always running the CPU at the fastest possible speed. However, the VXIpc-486 Model 200 Series—Models 200 and 240—have the option of running the CPU at a slower speed if you change a parameter in the BIOS `Setup` utility. If you choose the slower speed for the Model 200 Series computers, the **TURBO** LED will not be lit. Because the Model 500 Series and the Model 200 Series share the same front panel faceplate and LEDs, the **TURBO** LED exists on the Model 500 Series, but it is never lit.

I have a system that requires ruggedized chassis and bulkhead cables. Can I still use MXIbus to have multiple VXIbus chassis?

Yes, National Instruments sells MXIbus bulkhead cables. Contact National Instruments and ask for Technical Note 30, *Planning a MXIbus System Using MB Series Bulkhead Cables*, which describes the cables and discusses how to design the system.

Can I access 32-bit registers in my VXIbus system from the VXIpc-486?

Yes. Although the VXIpc-486 supports the ISA bus, it does not use the bus for communication with the VXIbus backplane. National Instruments has a specialized bus dedicated to the communication to the VXIbus backplane. This bus is a full 32 bits wide, and you can use it for D32 accesses.

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

CLK10 is a differential ECL signal on the backplane. However, the oscillator for the VXIpc-486 and the EXTCLK input from the front panel use TTL. Therefore, you need to supply a TTL-level signal for EXTCLK. Our voltage converters convert the signal to differential ECL.

What is the accuracy of the CLK10 signal?

The CLK10 signal generated by the VXIpc-486 is ±100 ppm (0.01%) as per the VXIbus specification. If you need a more accurate CLK10 signal, you can use the EXTCLK input at the front of the VXIpc-486.

If I boot the computer without video, and then plug in the video, why it is in black and white?

When the computer first boots, the video chips try to synchronize with the monitor. If the monitor is not there, the video chips cannot synchronize and establish color. You need to have the monitor attached at boot time to get color.

How do I connect a SCSI device to the VXIpc-486?

You need to install an ISA bus SCSI board in one of the ISA bus slots of the VXIpc-486. This means that you must have a two-slot VXIpc-486 and that one of the slots must be available. Also, check to see if your VXIpc-486 has two PC-height (<4.2 in.) slots or one PC-height and one AT-height (<4.8 in.) slot. Make sure that the SCSI board can fit in the slot, given the height restrictions. For proper installation, you must remove the AT bracket mounted on the board. Refer to Appendix F, *VXIpc-486 Plug-in Boards*, for more information.

National Instruments offers two SCSI interface options that you can consider when ordering a VXIpc-486. You can order part number 920100-13 for a SCSI adapter *without* BIOS if you do not intend to boot from an external SCSI hard drive. You can order part number 920100-14 for a SCSI adapter *with* BIOS if you do want to boot from an external SCSI hard drive. These SCSI boards are 16-bit and use programmed I/O for data transfers. They are not SCSI-2 compatible boards.

When you configure the SCSI board base I/O address, memory address, interrupt levels, and DMA channels, make sure that the settings do not conflict with those already used by the VXIpc-486. For more information about the VXIpc-486 settings, refer to Appendix G, *VXIpc-486 Hardware Configuration*.

How do I connect the VXIpc-486 to a network?

You will need to install an ISA bus Ethernet board in one of the ISA bus slots of the VXIpc-486. This means that you must have a two-slot VXIpc-486 and that one of the slots must be available. Also, check to see if your VXIpc-486 has two PC-height (<4.2 in.) slots or one PC-height and one AT-height (<4.8 in.) slot. Make sure that the Ethernet board can fit in the slot, given the height restrictions. For proper installation, you must remove the AT bracket mounted on the board.

National Instruments offers two Ethernet interface options that you can consider when ordering a VXIpc-486. You can order part number 920100-01 for an Ethernet adapter with a coaxial (BNC) connector. You can order part number 920100-02 for an Ethernet adapter with a twisted pair connector, which resembles a telephone jack. Both Ethernet boards also have generic Access Unit Interface (AUI) connectors that can connect to other Ethernet media through third-party Media Access Unit (MAU) boxes. These can be purchased from almost any Ethernet board manufacturer.

When you configure the Ethernet board base I/O address, memory address, interrupt levels, and DMA channels, make sure that the settings do not conflict with those already used by the VXIpc-486. For more information about the VXIpc-486 settings, refer to Appendix G, *VXIpc-486 Hardware Configuration*.

What type of video interface is present onboard the VXIpc-486? What video drivers are included with the VXIpc-486? Can I use Super VGA with my VXIpc-486? If my application requires a special type of video display, how do I configure my VXIpc-486?

The VXIpc-486 uses the Chips & Technology 452 video chip set, which is compatible with the Standard VGA video output MS Windows video driver, as well as the Chips & Technology CHIPS 452 VGA drivers for 640 by 480 (256 color), 800 by 600 (16 color), and 1024 by 768 (16 color). For information on the Super VGA video driver, refer to Appendix H, *Configuring the Super VGA Option*.

If your application requires a special type of video display, you can order the two-slot VXIpc-486 module without onboard video and install a specialized ISA bus video card in one of the ISA bus slots. Make sure that the video card can fit in the ISA bus slot, given the height restrictions. For proper installation, you must remove the AT bracket mounted on the board.

When you configure the video board base I/O address, memory address, interrupt levels, and DMA channels, make sure that the settings do not conflict with those already used by the VXIpc-486. For more information about the VXIpc-486 settings, refer to Appendix G, *VXIpc-486 Hardware Configuration*.

Are there any limitations on the types of monitors that can be connected to the VXIpc-486?

VXIpc-486 Model 500 Series computers that use Super VGA video output will work only with monitors having a horizontal scan rate of at least 50 kHz and a vertical scan rate of 60 Hz.

Warning: ***Make sure that your monitor meets this specification. Enabling the Super VGA option on a monitor that does not meet this specification will cause damage to your monitor.***

What type of connector must my keyboard possess to plug directly into the VXIpc-486? Is there a keyboard adapter cable available if my keyboard does not have this type of connector?

You can plug keyboards that have a 6-pin Mini DIN PS/2 type connector directly into the VXIpc-486. You can use the keyboard adapter cable that is included with every VXIpc-486 kit to adapt the larger AT keyboard connector to the 6-pin Mini DIN connector.

How do I connect a serial device to the COM2/GPIO connector on the VXI-pc486?

The easiest way to connect a serial device to the COM2/GPIO connector is to purchase the COM2 adapter cable (part number 182188-01), which brings out the serial port signals from the 15-pin COM2/GPIO connector to a standard 9-pin Subminiature DHD-20 connector. You can try to connect directly to the serial port signals on the COM2/GPIO connector. Refer to Appendix D, *Connectors*, for the connector pin descriptions.

How do I connect an external speaker to the VXIpc-486 to get audio capability?

A twisted-pair cable connects the front panel AUDIO/TRG OUT connector to the VXIpc-486 motherboard. By default, this cable is connected to two pins at J17 on the motherboard. With this configuration, TTL trigger signals can be passed out the front panel connector. For audio capability, connect the cable to the two pins at J13. Connect the external speaker to the front panel connector. The center pin of the SMB connector provides the audio signal. The shield of the SMB connector is GROUND.

How do I add more RAM to the VXIpc-486? What is the maximum amount of RAM that I can have on the VXIpc-486?

To add more RAM to the VXIpc-486, you need have to change the SIMMs that reside in slots A1 and A2 of the VXIpc-486. The SIMMs used for the VXIpc-486 Model 200 Series differ from those used for the Model 500 Series. The maximum amount of RAM on a VXIpc-486 Model 500 Series is 32 MB.

Note: ***Do NOT attempt to change the factory RAM configuration of a two-slot VXIpc-486 module. You must return your VXIpc-486/2 module to National Instruments for SIMM installation or else you will void your warranty.***

National Instruments recommends the following types of SIMMs for use with the VXIpc-486 Model 500 Series controllers:

1 MB: Hitachi part number HB56G25636B-7AL or equivalent 256 KB x 36 SIMMs

4 MB: Toshiba part number THM361020ASG-70 or equivalent 1 MB x 36 SIMMs

16 MB: Toshiba part number THM364020SG-70 or equivalent 4 MB x 36 SIMMs

The physical dimensions of the 1 MB and 4 MB SIMMs are as follows:

- 107.95 mm in length
- 5.08 mm in thickness
- 25.4 mm in height

The physical dimensions of the 16 MB SIMM are as follows:

- 107.95 mm in length
- 9.4 mm in thickness
- 25.4 mm in height

Do not exceed these physical dimensions when choosing an equivalent SIMM.

I am trying to install an ISA bus board in one of the ISA bus slots and it is too tall for the metal cover to fit on the VXIpc-486. What options do I have if I must use this board?

You could consider getting a VXIpc-486 without an internal floppy drive, so that you can use the AT-height slot for any ISA bus board (<4.8 inches). If you choose this option, you can use an external floppy drive instead of an internal floppy drive. To arrange to have your VXIpc-486 reconfigured with an AT-height slot, contact your National Instruments Inside Sales Representative or Regional Sales Manager.

Which interrupt levels are free to be used by ISA bus boards?

Interrupt levels 5, 9, 10, and 15 are free to be used by ISA bus boards. See Appendix G, *VXIpc-486 Hardware Configuration* for information on the available port I/O register space, upper memory area, interrupts, and DMA channels.

Which area of upper memory (adapter space) is free for use by ISA bus boards or expanded memory manager software programs?

The upper memory from D000h to DFFFh is free for use by ISA bus boards or expanded memory manager software programs. The VXIpc-486 needs upper memory from C800h to CFFFh and from E000h to EFFFh so that it can access the devices in VXI address space. See Appendix G, *VXIpc-486 Hardware Configuration* for information on the available port I/O register space, upper memory area, interrupts, and DMA channels.

How do I install the VXIpc-486 in a slot other than Slot 0?

The VXIpc-486 is factory configured as a Slot 0 device. If you want to install the VXIpc-486 in a different slot of your mainframe, you must perform the following steps. Refer also to Chapter 2, *VXIpc-486 Configuration and Installation,* for explanations and illustrations that show both the configurations and the location of the jumpers.

1. Move the W26 jumper to the leftmost two pins. The new configuration causes the MODID signal to be terminated with an 825 Ω pull-down resistor.

2. Move the W25 jumper to the upper two pins. The new configuration disables the default System Controller functions.

3. Move the jumpers from jumpers W35 and W36 to jumpers W32 and W33 in the jumper block of pins. In the new configuration, the VXIpc-486 accepts the CLK10 signal from the backplane.

4. Install the board in a slot other than Slot 0.

How do I view the BIOS setup parameters to check the configuration of the memory, floppy drive, hard drive, time/date, and so on?

Follow these steps to view the BIOS setup parameters.

1. Reboot the VXIpc-486.
2. During the memory tests, press the <F2> key.
3. After hitting the <F2> key, you will get a menu listing the screens that you can enter. Select the `Setup` screen, which shows all the important parameters concerning your system.

Refer to Chapter 3, *BIOS Setup*, for more information.

How do I disable the automatic memory check when booting the VXIpc-486? Are there any side effects to disabling the automatic memory check?

Follow these steps to make the change in BIOS.

1. Reboot the VXIpc-486.
2. During the system tests, press the <F2> key.
3. Select **Extended BIOS Features** from the menu.
4. From this menu select the **Quick Boot** parameter and set it to **Yes**.
5. Press <F10> to save the configuration.
6. Press <Esc> until you exit the BIOS `Setup` utility.

The only side effect of disabling the automatic memory check is that you cannot boot off a floppy disk. One advantage is that you can leave a floppy disk in the floppy drive when rebooting the VXIpc-486.

Appendix J
Troubleshooting

This appendix addresses system-related 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 or causes the system to hang.
- Running the `RESMAN` Resource Manager program results in incorrect data or causes the system to hang.
- The VXIpc-486 and/or its installed components (such as GPIB, COM Port) fail to work once ISA bus plug-in cards are installed.
- The network card installed does not operate properly.
- The hard disk drive reports failures or other errors.

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 address space

In addition, the VXIpc-486 components require port I/O register space, interrupts, and DMA channels. These resources are statically allocated. For more details, refer to Appendix G, *VXIpc-486 Hardware Configuration*.

If you are unable to resolve your problem, and you have checked Appendix I, *Common Questions*, for a solution to your problem, please fill out the appropriate forms in Appendix K, *Customer Communication*, and contact National Instruments.

What information should I have before I call National Instruments?

Make sure that none of the following questions relate to the problem you are having, and that the suggestions contained in the answers do not correct the problem. Appendix I, *Common Questions*, may also contain the solution to your problem. When you call National Instruments, make sure you have filled out the *VXIpc-486 Model 500 Series Hardware and Software Configuration Form* in Appendix K. If you are using NI-VXI software with your VXI-pc486, use the configuration form in your software manual to describe your software settings.

Why does RESMAN report warnings/errors about devices that do not exist in my system?

If the VXIINIT program runs successfully but you encounter problems with RESMAN, the Resource Manager program, the cause is probably that your system contains a device that already occupies all or some of the upper memory area that is allocated for the master windows. The master windows consist of 32 KB and 64 KB blocks of contiguous 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. On a VXIpc-486, the master windows occupy the memory regions from a base address of C800h to CFFFh, and E000h to EFFFh.

To solve this problem, first determine what area of upper memory your devices use. Then move your device to the unused area of upper memory from D000h to DFFFh. 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.

In addition to the above problems, 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.

Why does RESMAN hang the system even though VXIINIT works fine?

This is most likely caused by a conflict with the master window. See the previous question, *Why does RESMAN report warnings/errors about devices that don't exist in my system?*

Why does the VXIpc-486 and/or its installed components (GPIB, COM port) fail to work once ISA bus plug-in cards are installed?

The VXIpc-486 and its components use port I/O register space, interrupts, and DMA, just like a desktop PC. If installing an ISA bus card causes something to stop working, it is very likely that you have a conflict of these resources between the VXIpc-486 and the plug-in card. See Appendix G, *VXIpc-486 Hardware Configuration*, for the resources that the VXIpc-486 uses.

Why does my network not work properly?

There can be a possible conflict with the network card in your system. See the question *Why does the VXIpc-486 and/or its installed components (GPIB, COM port) fail to work once ISA bus plug-in cards are installed?* above.

In addition, most network cards use some portion of the upper memory area, usually between D000h to EFFFh, for their operation. Because the VXIpc-486 also uses some of this memory area, the computer and the network card may be conflicting. See *Why does RESMAN report warning/errors about devices that don't exist in my system?* earlier in this section for more information.

When my computer boots, it says that it cannot access the hard disk drive (HDD), or says `System Not Found`, or `Fixed Disk Failure`. Is my HDD damaged?

It is not uncommon for the computer to be unable to access the HDD if the system loses power during certain times of operation. Try the following procedure to fix the problem.

1. Reboot the VXIpc-486 and, during the system tests, press the <F2> key.
2. Select **Setup** from the menu.
3. Press the <F9> key to Auto Configure the system.
4. Press <F10> to save the configuration.
5. Press <Esc> until you exit the BIOS `Setup` utility.
6. If the errors do not go away, power off your mainframe, remove the VXIpc-486, and check the hard drive settings on its label.
7. Reinsert the VXIpc-486, power on the mainframe, go back into the BIOS `Setup` utility, and make sure that the hard drive parameters match those printed on the label.
8. If the errors do not go away, open the VXIpc-486 and make sure the hard drive cable and power cable are securely attached to the hard drive.

If this procedure did not fix the problem, check to see if you can boot off a floppy DOS disk and then change the drive to `C`. If the problem persists, your HDD is probably damaged and may need to be reformatted or repaired.

Caution: ***You should NOT reformat the disk unless directed by National Instruments support personnel. The HDD controller may have a problem, or a fuse may have blown, causing the HDD to fail. Reformatting the drive prematurely may not fix the problem but could result in a loss of data. Contact National Instruments for repair information.***

Appendix K
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.

Corporate Headquarters
(512) 795-8248
Technical support fax: (800) 328-2203
(512) 794-5678

Branch Offices	**Phone Number**	**Fax Number**
Australia	(03) 879 9422	(03) 879 9179
Austria	(0662) 435986	(0662) 437010-19
Belgium	02/757.00.20	02/757.03.11
Denmark	45 76 26 00	45 76 71 11
Finland	(90) 527 2321	(90) 502 2930
France	(1) 48 14 24 00	(1) 48 14 24 14
Germany	089/741 31 30	089/714 60 35
Italy	02/48301892	02/48301915
Japan	(03) 3788-1921	(03) 3788-1923
Netherlands	03480-33466	03480-30673
Norway	32-848400	32-848600
Spain	(91) 640 0085	(91) 640 0533
Sweden	08-730 49 70	08-730 43 70
Switzerland	056/20 51 51	056/20 51 55
U.K.	0635 523545	0635 523154

Technical Support Form

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

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

Name _____

Company _____

Address _____

_____

Fax (___)_____ Phone (___)_____

National Instruments hardware product model _____ Revision _____

Operating system _____

Speed _____MHz RAM _____MB Display adapter _____

Mouse _____yes _____no Other adapters installed _____

Hard disk capacity _____MB Brand _____

Instruments used _____

National Instruments software product _____ Version _____

Configuration _____

The problem is _____

_____

_____

_____

_____

List any error messages _____

_____

_____

_____

_____

The following steps will reproduce the problem _____

_____

_____

VXIpc-486 Model 500 Series Hardware and Software Configuration Form

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

National Instruments Products

- VXIpc-486 Model 500 Series ID Label Information
  - Model Number _____ 500 _____ 566 _____ 599
  - Complete Part Number (including 3-digit suffix) _____
  - Serial Number _____
  - Revision Number _____
  - Fixed Disk Type (See ID label on module cover) _____
- VXIpc-486 Model 500 Series 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

- 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 _____

- NI-VXI Version _____

  Use the configuration form in your software manual to describe your NI-VXI software settings.

Other Products

- Operating System _____
- Application _____
- I/O Expansion Cards–VXIpc-486/2 only
  (Manufacturer, Model) _____

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

Manufacturer	Model	Function	Slot	Logical Address

Continue on a separate sheet, if necessary.

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

- IEEE 488 Devices (Manufacturer, Model, GPIB Address)

- Any Other Software in System _____

  Please describe your software configuration settings below.

Documentation Comment Form

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

Title: **Getting Started with Your VXIpc™-486 Model 500 Series**

Edition Date: **September 1994**

Part Number: **320867A-01**

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

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

Thank you for your help.

Name _____

Title _____

Company _____

Address _____

_____

Phone (_____) _____

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(512) 794-5678

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 Electronic 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	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

m	meters
MB	megabytes of memory
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

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

RAM	random-access memory
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.
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 for which the 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
VME	Versa Module Eurocard or IEEE 1014
VXIbus	VMEbus Extensions for Instrumentation

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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