

# **Getting Started with Your VXI-MC6000 and the NI-VXI™ Software for AIX**



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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

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This manual contains instructions for installing and configuring the National Instruments VXI-MC6000 interface kit. This manual is meant to be used with the *NI-VXI Software Reference Manual for C* and the *NI-VXI Text Utilities Reference Manual*.

## How to Use the Documentation Set

Begin by reading this manual to guide you through the installation and configuration of the hardware and software. The software configuration requires that you first complete the installation and configuration of the hardware.

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

## Organization of This Manual

*Getting Started with Your VXI-MC6000 and the NI-VXI Software for AIX* is organized as follows:

- Chapter 1, *Introduction*, describes the VXI-MC6000 interface kit, lists what you need to get started, and lists optional equipment of your kit.
- Chapter 2, *Hardware Configuration and Installation*, contains the instructions to configure and install the VXI-MC6000 interface kit.
- Chapter 3, *NI-VXI Software Installation and Configuration*, lists all the programs and files located on the NI-VXI distribution diskette, contains instructions for installing and configuring the NI-VXI software for AIX, and contains a description of the `vxitedit` configuration editor.
- Appendix A, *Specifications*, lists various module specifications of the MC-MXI and VXI-MXI, such as physical dimensions and power requirements.
- Appendix B, *Customer Communication*, contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The *Glossary* contains an alphabetical list and description of terms used in this manual, including abbreviations, acronyms, metric prefixes, and symbols.



## Conventions Used in This Manual

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

<i>italic</i>	Italic text denotes emphasis, a cross reference, menu items, or an introduction to a key concept.
<b><i>bold italic</i></b>	Bold italic text denotes a note, caution, or warning.
monospace	Text in this font denotes text or characters that are to be literally input from the keyboard, the proper names of disk drives, paths, directories, programs, subprograms, device names, filenames and extensions, and for statements and comments taken from program code.

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
- *VXI-MXI User Manual*, National Instruments Corporation

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

# Chapter 1

## Introduction

---

This chapter describes the VXI-MC6000 interface kit, lists what you need to get started, and lists optional equipment.

The VXI-MC6000 interface kit links any RISC System/6000 computer system directly to the VXIbus. A RISC System/6000 computer equipped with a VXI-MC6000 can function as a VXI Commander, Servant, and Resource Manager. The VXI-MC6000 makes the computer perform as though it were plugged directly into the VXI backplane as an embedded CPU VXI module.

### What You Need to Get Started

- AIX operating system installed on your RISC System/6000 computer
- MC-MXI interface board
- Standard VXI-MXI interface module
- or
- Enhanced VXI-MXI interface module with INTX option
- NI-VXI distribution disk for the MC-MXI and AIX
- 2 m Type M1 MXIbus cable

**Note:** *The 2 m Type M1 MXIbus cable is included in your kit unless you specified otherwise in your order. You may have ordered your kit without this cable so that you could order a different type or length of MXIbus cable. Refer to the Optional Equipment section.*

## Optional Equipment

Contact National Instruments for ordering information for any of the following optional equipment.

- VXI-MXI Standard VXIbus Mainframe Extender
- VXI-MXI Enhanced VXIbus Mainframe Extender
- VME-MXI Standard VMEbus Chassis Extender
- VME-MXI Enhanced VMEbus Chassis Extender
- MXIbus Terminating Pac (External)
- Type M1 MXIbus cables (straight point-to-point connectors)
- Type M2 MXIbus cables (straight point-to-right angle daisy-chain connectors)
- Type M3 MXIbus cables (right angle point-to-right angle daisy-chain connectors)

The Type M1, M2, and M3 MXIbus cables are available in the following lengths:

- 1 m
- 2 m
- 4 m
- 8 m
- 20 m

# Chapter 2

## Hardware Configuration and Installation

---

This chapter contains the instructions to configure and install the VXI-MC6000 interface kit. The instructions are given in the order that you should perform them. A summary of the steps is as follows:

1. Unpack the MC-MXI and VXI-MXI hardware.
2. Install the MC-MXI hardware.
3. Configure the VXI-MXI hardware.
4. Install the VXI-MXI hardware.
5. Connect the MXIbus cable.

### Step 1. Unpack the MC-MXI and VXI-MXI Hardware

Follow these steps when unpacking your MC-MXI board and VXI-MXI module:

1. Inspect the shipping container and its contents for damage before attempting to configure or install the MC-MXI and VXI-MXI. If damage appears to have been caused in shipment, file a claim with the carrier. Retain the packing material for possible inspection and/or reshipment.
2. Verify that the pieces contained in the package you received match the kit parts list (See Chapter 1 of this manual). *Do not* remove the boards from their plastic bags at this point.
3. Touch the bags to a metal part of your computer chassis before removing the boards from their antistatic bags. Your MC-MXI board and VXI-MXI module are shipped packaged in antistatic plastic bags to prevent electrostatic damage. Some of the circuitry on the MC-MXI and VXI-MXI use CMOS technology and can be damaged by electrostatic discharge.
4. Avoid touching any of the IC components or connectors. Be sure to handle the boards only by their edges as you remove them from their bags. Inspect them for loose components or any other sign of damage. Notify National Instruments if either board appears damaged in any way. *Do not* install equipment that appears to be damaged.

## Step 2. Install the MC-MXI Hardware

The following instructions are general installation instructions. Consult the user or technical reference manual of your computer for specific instructions and warnings.

1. Shut down your computer before installing the MC-MXI, but leave it plugged in. The plug grounds the computer and protects it from electrical damage while you are setting up.

**Warning:** *To protect both yourself and the computer from electrical hazards, the computer should remain off until you are finished installing the board.*

2. Remove the top cover or access port to the Micro Channel expansion slots.
3. Select a 32-bit full length expansion slot. These slots have a longer card edge expansion connector than those found on 16-bit slots. Most Micro Channel computers have an assortment of both 16-bit and 32-bit expansion slots. A 32-bit board, such as the MC-MXI, cannot be installed in a 16-bit expansion slot.
4. Locate the metal bracket that covers the cut-out in the back panel of the computer for the Micro Channel slot you have selected. Loosen the bracket-retaining thumbscrew and remove the bracket.
5. Touch the metal part of the power supply case inside the computer to discharge any static electricity that may be on your clothes or body.
6. Line up the edge connector of the MC-MXI board with the 32-bit Micro Channel connector in your computer. Also line up your MC-MXI board with the corresponding plastic card guide. Slowly push down on the front of the MC-MXI until its card edge connector is resting on the Micro Channel slot. Using slow, evenly distributed pressure, press the MC-MXI straight down until it seats in the slot. Figure 2-1 shows how to install your MC-MXI board.

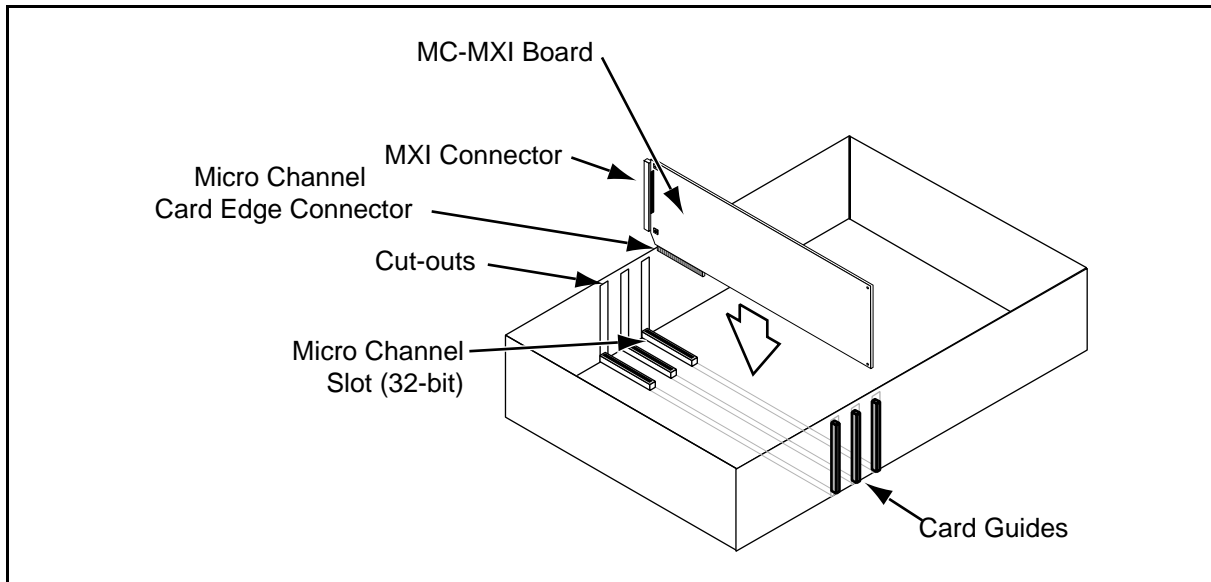


Figure 2-1. Installing the MC-MXI Board

7. Tighten the bracket retaining thumbscrew to secure the MC-MXI to the back panel rail.
8. Check the installation, and replace the computer cover.

### Step 3. Configure the VXI-MXI Hardware

You received either a standard or enhanced VXI-MXI module with your VXI-MC6000 interface kit. The enhanced version includes the Interrupt and Timing Extension (INTX) daughter card option, which provides additional functionality for a multiple-mainframe VXI configuration. This section describes how to configure the following options, which apply to either version of the VXI-MXI:

- Slot 0/Non-Slot 0
- VMEbus Bus Timeout
- VXI Logical Address
- VMEbus Request Level

Do not change the default settings of other jumpers and switches on the VXI-MXI module unless you plan to install more than one VXI-MXI in the same mainframe. If this is the case, refer to the *VXI-MXI User Manual* that came with your additional VXI-MXI interface for more information. The user manual also contains specific information about using the INTX daughter card option.

Figure 2-2 shows the location and factory default settings of the configuration switches and jumpers for a VXI-MXI without the INTX daughter card option. Figure 2-3 shows the factory default settings for a VXI-MXI with INTX.

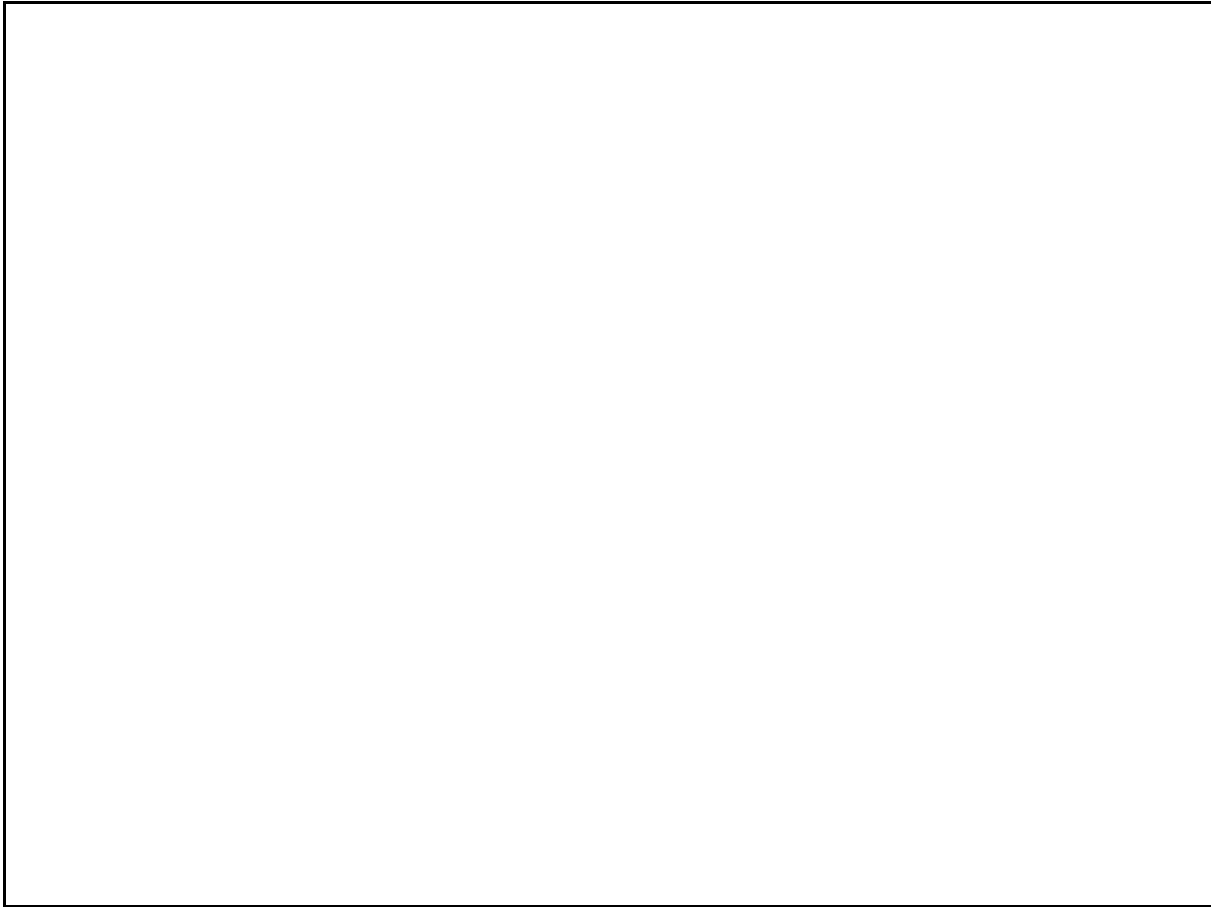


Figure 2-2. VXI-MXI without INTX Parts Locator Diagram

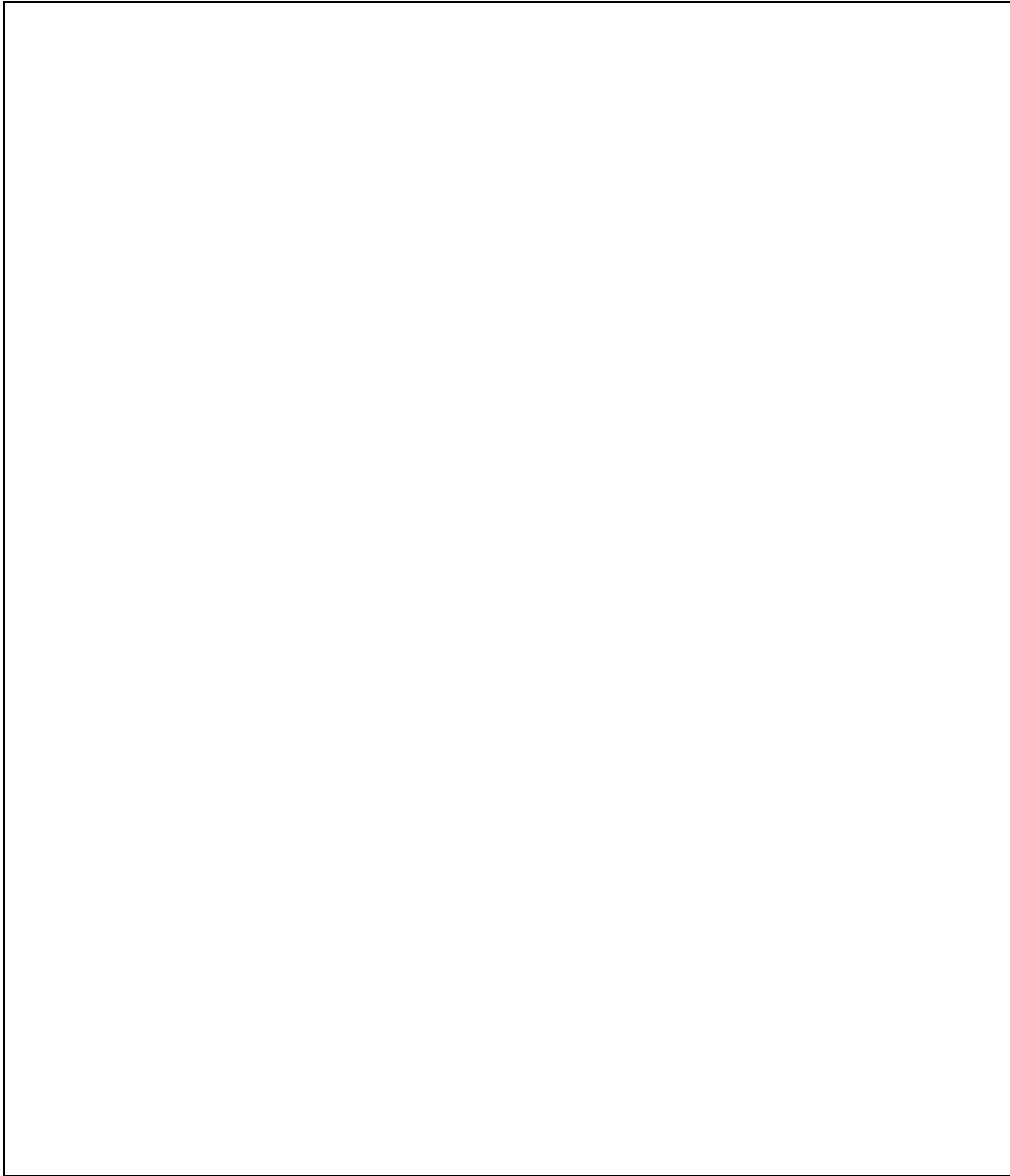


Figure 2-3. VXI-MXI with INTX Parts Locator Diagram



## Front Panel Features

The VXI-MXI has the following front panel features:

- Three front panel LEDs
  - **FAILED** LED indicates that the VMEbus SYSFAIL line is asserted.
  - **VXI ACCESS** LED indicates when the VXI-MXI is accessed from the VXIbus.
  - **MXI ACCESS** LED indicates when the VXI-MXI is accessed from the MXIbus.
- MXIbus connector
- Three SMB connectors
  - Trigger input
  - Trigger output
  - External clock
- System reset pushbutton
- INTX connector (if you have a VXI-MXI with the INTX daughter card connection)

## Removing the Metal Enclosure

The VXI-MXI is housed in a metal enclosure to improve EMC performance and to provide easy handling. The enclosure includes cut-outs so that you should not have to remove it to change the switch and jumper settings.

If you find it necessary to open the enclosure, remove the three screws on the top, the three screws on the bottom, and the three screws on the right side panel of the enclosure.

## VXIbus Slot 0

The VXI-MXI is shipped from the factory configured to be installed in Slot 0 of the VXIbus mainframe. If another device is already in Slot 0, you must decide which device will be the Slot 0 device and reconfigure the other device for Non-Slot 0 use.

**Warning:** *Do not install a device configured for Slot 0 into another slot without first reconfiguring it for Non-Slot 0 use. Doing so could result in damage to the Non-Slot 0 device, the VXIbus backplane, or both.*

Figure 2-4 shows the default configuration settings for the VXI-MXI installed as the Slot 0 device.

To configure the VXI-MXI as a Non-Slot 0 device, change slide switches S1 and S8 and jumper blocks W7 (labeled *VME BTO Chain Position* on the front panel), and W9 and W10 (labeled *CLK10 Source Select* on the front panel) as shown in Figure 2-5.

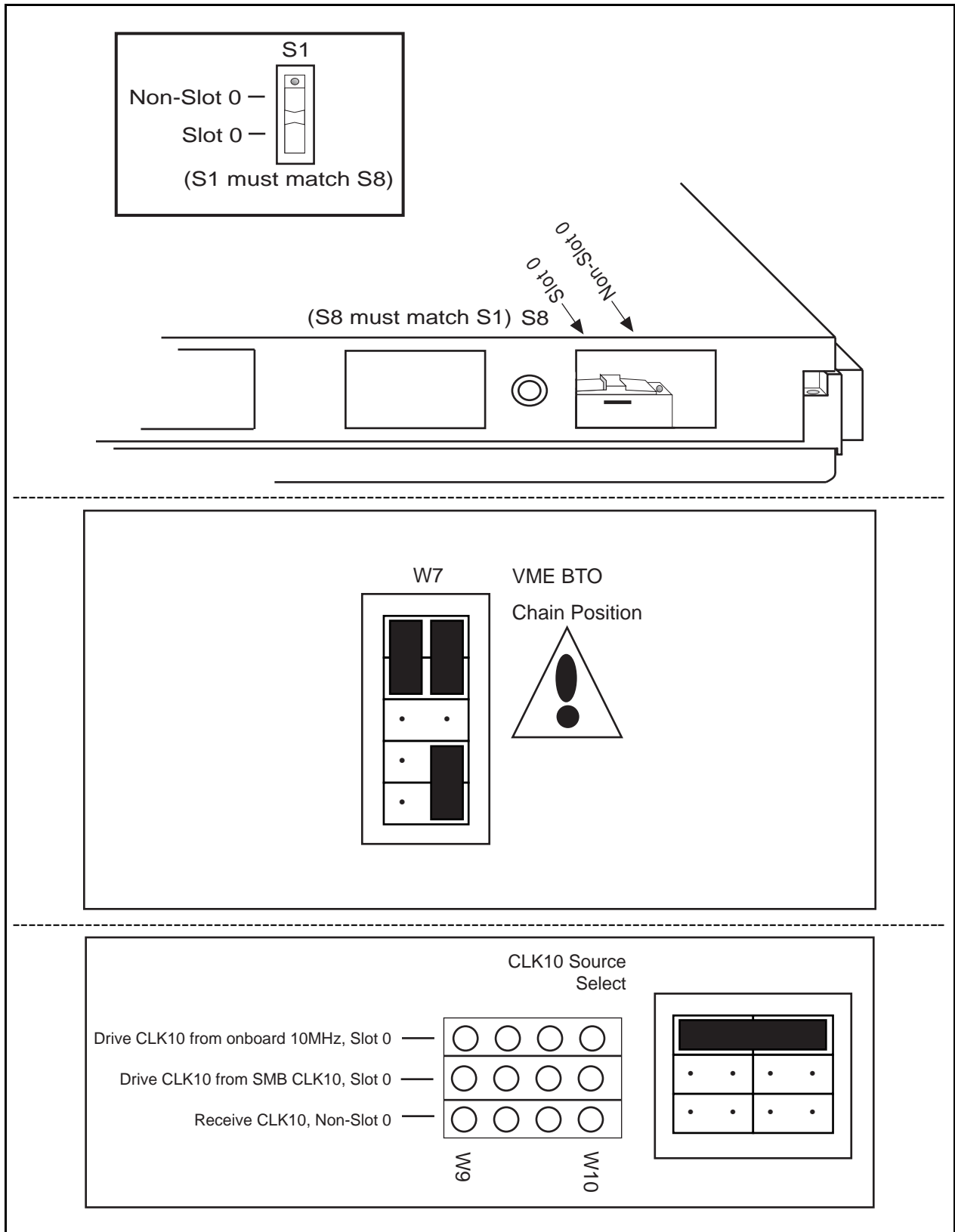


Figure 2-4. VXIbus Slot 0 Configuration

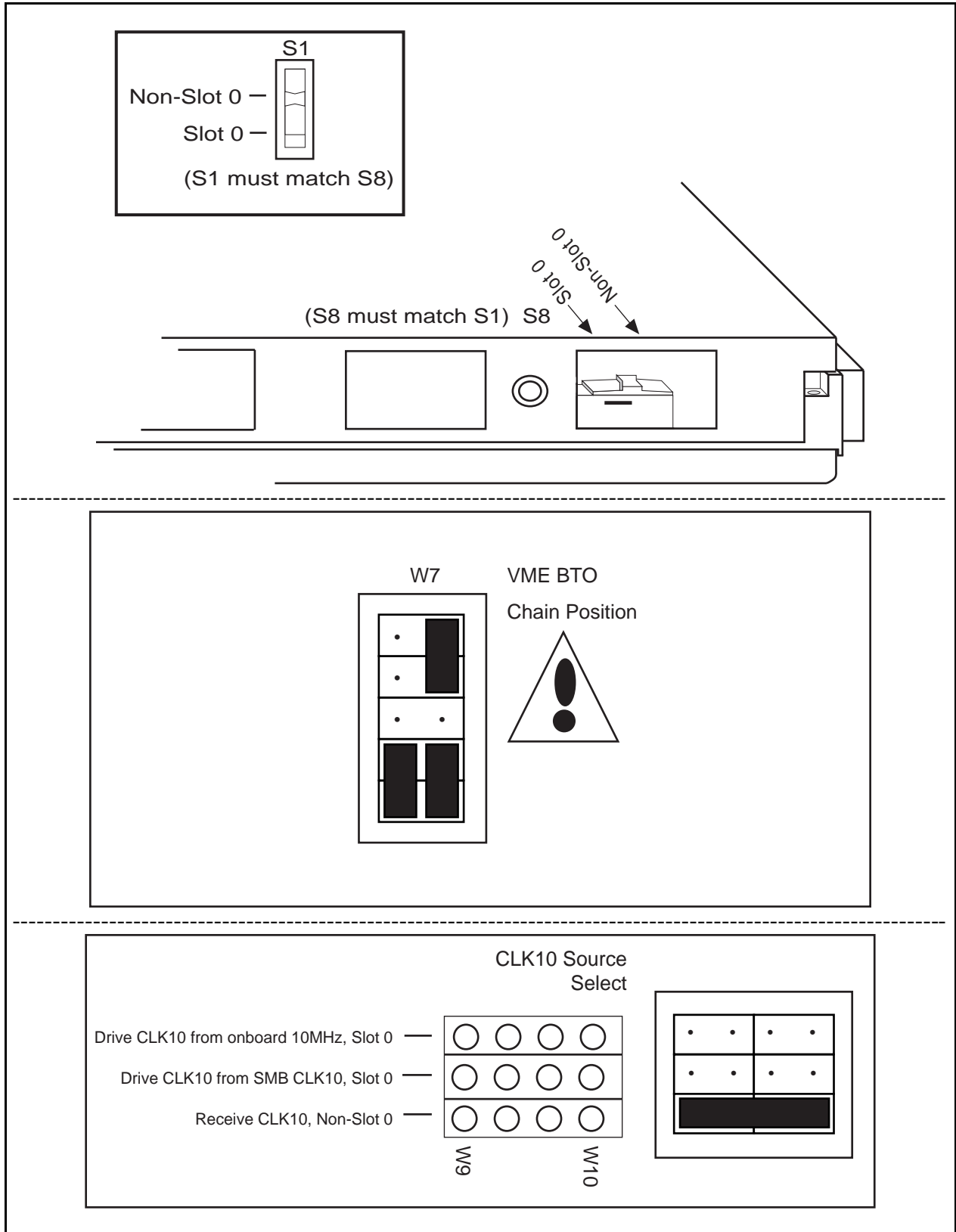


Figure 2-5. VXIbus Non-Slot 0 Configuration

When the VXI-MXI is installed in Slot 0, it becomes the VMEbus System Controller (set by slide switches S1 and S8). As a VMEbus System Controller, it has VMEbus Data Transfer Bus Arbiter (PRI ARBITER) circuitry that accepts bus requests on all four VMEbus request levels, prioritizes the requests, and grants the bus to the highest priority requester. As VMEbus System Controller, the VXI-MXI also drives the 16 MHz VMEbus system clock by an onboard 16 MHz oscillator with a 50%  $\pm$ 5% duty cycle.

The VXI-MXI also performs VMEbus BTO functions as described in the following section. The setting of the VME BTO Chain Position jumper block determines how to control these functions. As required by the VXIbus specification for a Slot 0 device, the VXI-MXI drives the 10 MHz signal, CLK10, on a differential ECL output. This ECL output is controlled by the CLK10 Source Select jumpers at locations W9 and W10. The Slot 0 setting of the CLK10 Source Select jumpers cause the VXI-MXI to drive CLK10 on the backplane. When configured for Non-Slot 0, the VXI-MXI instead receives the CLK10 signal.

**Warning:** *Configuring more than one VXIbus device to drive the CLK10 lines can damage the VXIbus backplane or the CLK10 drivers on the VXIbus devices.*

## VMEbus BTO

The VMEbus Bus Timeout (BTO) is a timer for transfers on the VMEbus Data Transfer Bus. After a specified amount of time (usually user-configurable), the BTO circuitry terminates a VMEbus cycle if no slave has responded. The VXI-MXI, which links the VXIbus and MXIbus, should control the Bus Timeout on the VXIbus to prevent premature termination for MXIbus cycles to the VXIbus, and vice versa. Therefore, you should disable the BTO of any other module residing in the mainframe. If you cannot disable a BTO setting, set it to the maximum value to give the MXIbus cycles as much time as possible to complete.

## VXI Logical Address

Each device in a VXIbus/MXIbus system is assigned a unique number between 0 and 254. This 8-bit number, called the *logical address*, defines the base address for the VXI configuration registers located on the device. With unique logical addresses, each VXIbus device in the system is assigned 64 bytes of configuration space in the upper 16 KB of A16 space.

Some VXIbus devices have *dynamically configurable* logical addresses. These devices have an initial logical address of hex FF or 255, which indicates that they can be dynamically configured. While the VXI-MXI does support dynamic configuration of VXI devices within its mainframe, it is itself a *statically configured* device and is preset at the factory with a VXI logical address of 1.

If you want to designate the MC-MXI as VXIbus Resource Manager (RM), it must keep its default logical address of 0. Therefore, ensure that no other statically configurable VXIbus devices have logical addresses of either 0 or 1. If they do, change the logical address settings of those devices so that every device in the system has a unique associated logical address.

Do not change the logical address of the VXI-MXI unless you are connecting multiple VXI-MXIs to the MXIbus. In this case, refer to the *VXI-MXI User Manual* that came with your additional VXI-MXIs for more information. You can change the logical address of the VXI-MXI by changing the setting of the 8-bit DIP switch labeled *LOGICAL ADDRESS SWITCH* on the front panel. The ON position on the DIP switch corresponds to a logic value of 0, and the OFF position corresponds to a logic value of 1. Verify that the VXI-MXI does not have the same logical address as any other statically configured VXIbus device in your system. Remember that logical addresses hex 0 and FF are not allowed for the VXI-MXI. Figure 2-6 shows switch settings for logical address hex 1 and C0.

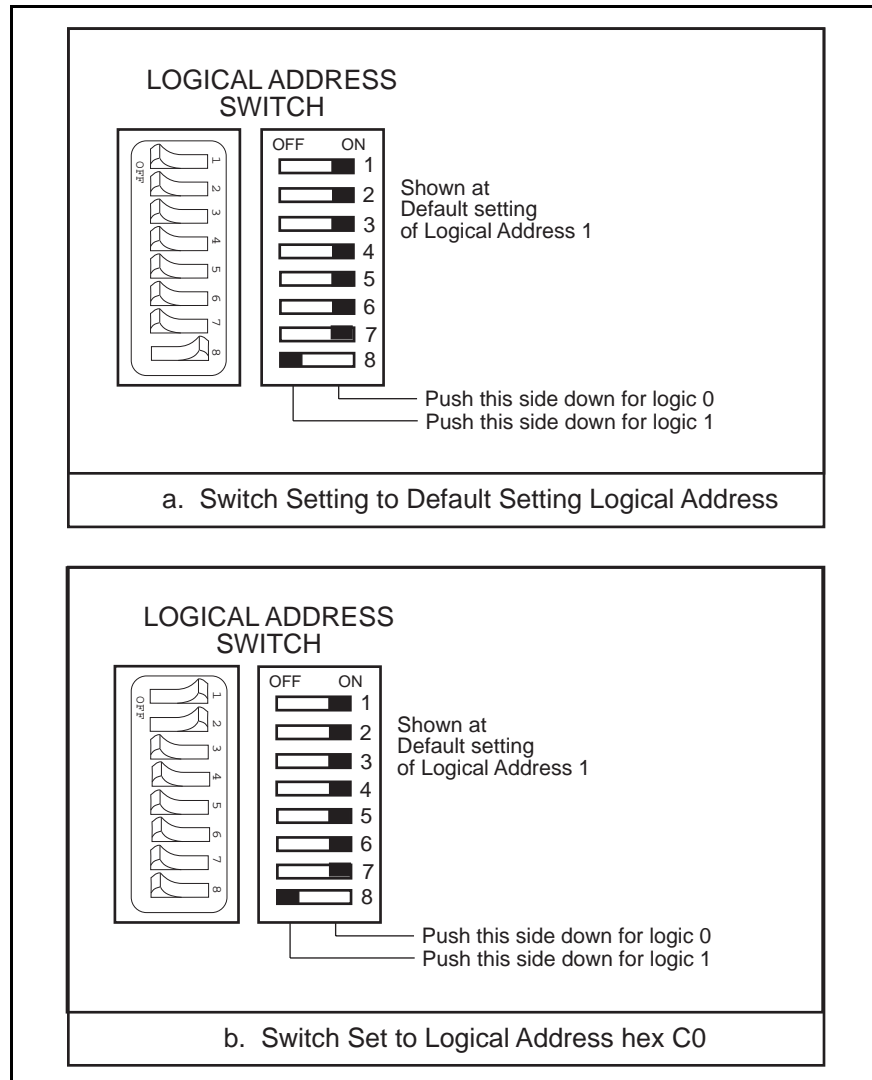


Figure 2-6. Logical Address Selection

## VMEbus Request Level Selection

The VXI-MXI uses one of the four VMEbus request levels to request use of the VME Data Transfer Bus (DTB). The VXI-MXI requests use of the DTB whenever an external MXIbus device, such as a computer with an MC-MXI interface, attempts a transfer that maps into the VXIbus mainframe.

The VXI-MXI uses VMEbus request level 3 in its factory default setting, as required by the VXIbus specification. This is suitable for most VXIbus systems. However, you can change the VXI-MXI to use any of the other three request levels (0, 1, or 2) by changing the jumper configuration on the jumper blocks labeled *VMEbus Request Level* on the front panel. You may want to change request levels to change the priority of the VXI-MXI request signal. For more information, refer to the VMEbus specification.

To change the VMEbus request level of the VXI-MXI, rearrange the jumpers on the pin arrays as shown in Figure 2-7.

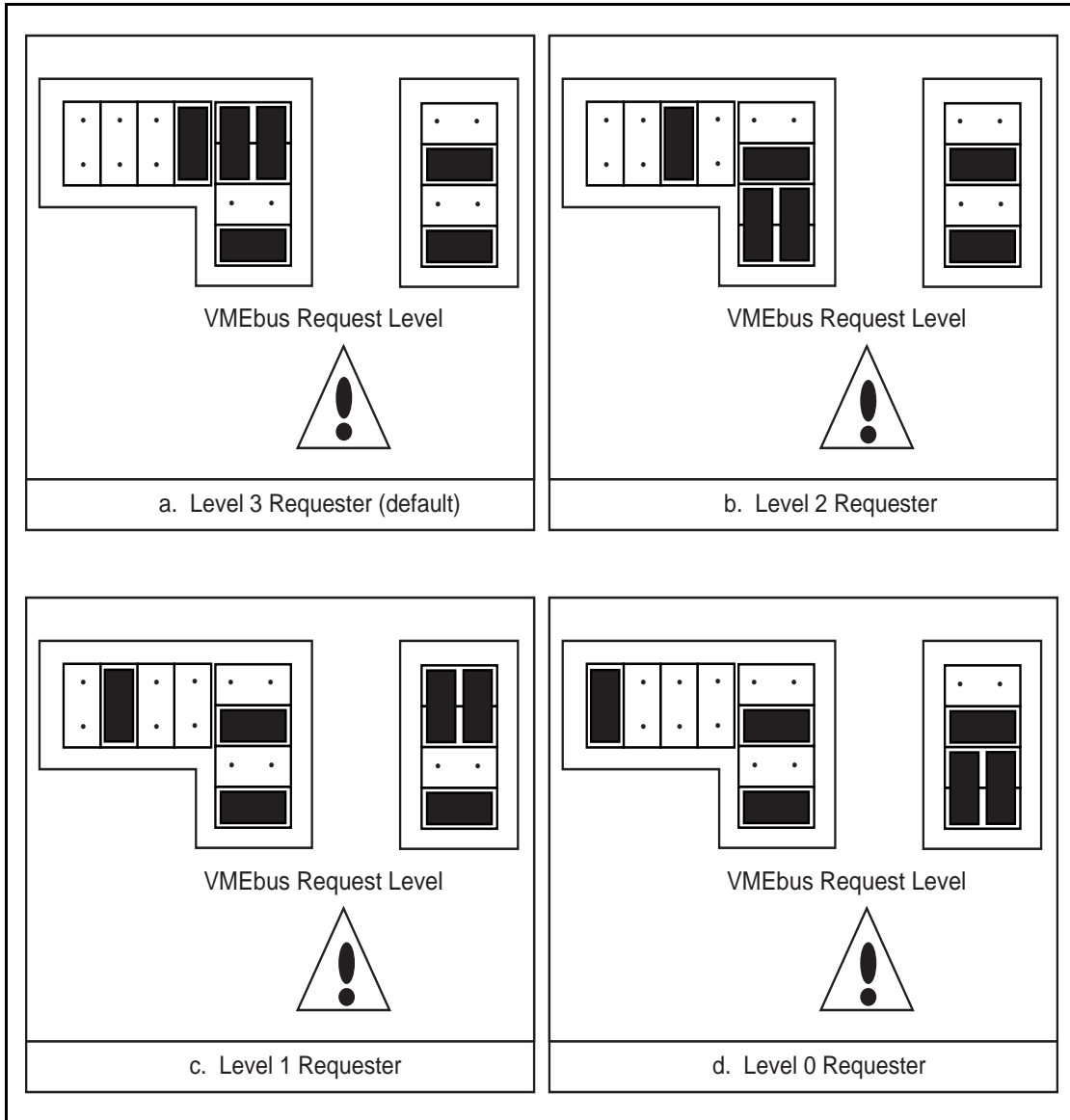


Figure 2-7. VXI-MXI VMEbus Requester Jumper Settings

## Step 4. Install the VXI-MXI Hardware

This section lists general installation instructions for the VXI-MXI. Consult the user manual or technical reference manual of your VXIbus mainframe for specific instructions and warnings.

1. Plug in your mainframe before installing the VXI-MXI. The plug grounds the mainframe and protects it from electrical damage while you are installing boards.

**Warning:** *To protect both yourself and the mainframe from electrical hazards, the mainframe should remain off until you are finished installing the board.*

2. Remove or open any doors or covers blocking access to the mainframe slots.
3. Install a support designed for installing C-size cards in D-size mainframes, if you are installing the VXI-MXI in a D-size mainframe.

**Warning:** *Be certain that the slot you select in your VXIbus mainframe matches the VXI-MXI configuration as either a Slot 0 device or a Non-Slot 0 device. If you install your VXI-MXI into a slot that does not correspond with the jumper settings, you risk damage to the VXI-MXI, the VXIbus backplane, or both.*

4. Insert the VXI-MXI in the slot you have selected by aligning the top and bottom of the card with the card-edge guides inside the mainframe. Slowly push the VXI-MXI straight into the slot until its plug connectors are resting on the receptacle connectors on the backplane. Using slow, evenly distributed pressure, press the VXI-MXI straight in until it seats in the expansion slot. The front panel of the VXI-MXI should be even with the front panel of the mainframe.
5. Tighten the retaining screws on the top and bottom edges of the front panel.
6. Check the installation.
7. Connect the cables as described in the following section before restoring power.
8. Replace or close any doors or covers to the mainframe.



## Step 5. Connect the MXIbus Cable

There are two basic types of MXIbus cables. MXIbus cables can have either a single connector on each end, or a single connector on one cable end and a double connector on the other end. Your VXI-MC6000 kit comes standard with a cable with single connectors on each end.

### Nonpolarized Cables

The cable with a single connector on each cable end is nonpolarized and may be installed with either end connected to either device. Be sure to tighten the screw locks to ensure proper pin connection. See Figure 2-8.



Figure 2-8. MXIbus Single-Ended Cable Configuration

## Polarized Cables

If you are using a MXIbus cable with a single connector on one cable end and a double connector on the other end, it is a polarized cable that must be installed correctly for the system to function properly. Connect the end with the *single* connector to the MC-MXI and the end of the cable with the *double* connector to the VXI-MXI. See Figure 2-9.

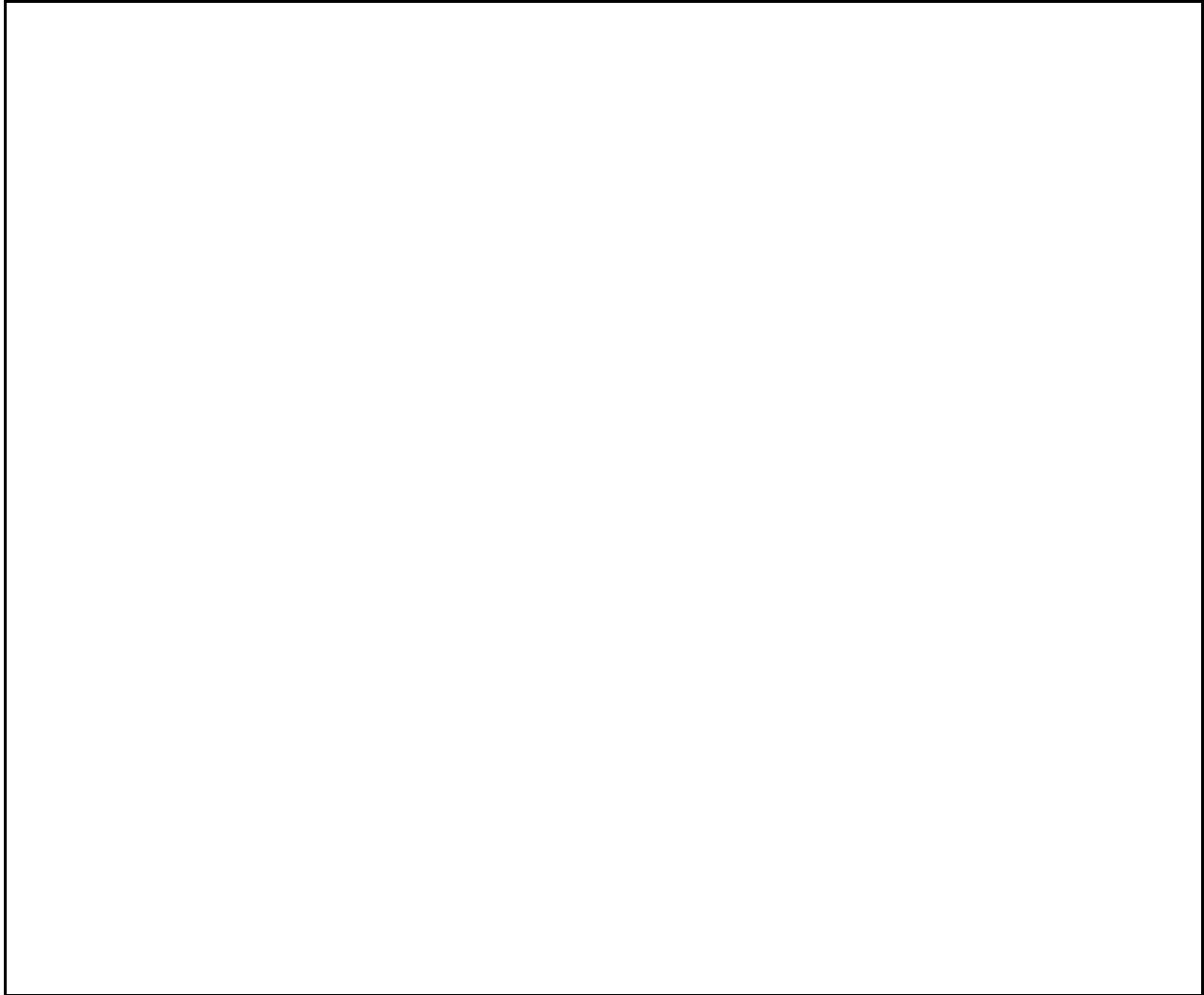


Figure 2-9. MXIbus Dual-Ended Cable Configuration

When the MXIbus cable is properly connected, turn on the VXI mainframe and then the computer.

**Note:** *Always turn on the mainframe first. Doing so makes it possible for the computer to access the VXI cards in the mainframe as soon as it starts up.*

# Chapter 3

## NI-VXI Software Installation and Configuration

---

This chapter lists all the programs and files located on the NI-VXI distribution diskette, contains instructions for installing and configuring the NI-VXI software for AIX, and contains a description of the `vxitedit` configuration editor.

### NI-VXI Software Overview

The following sections describe the files on the *NI-VXI Distribution Diskette for MC-MXI for AIX* (hereafter referred to as the NI-VXI distribution diskette).

#### Main Programs and Files

The following are the main programs and files of the NI-VXI software package:

- `vxiiinit` is the MXIbus initialization program. This program initializes the MC-MXI board for operation. Run this program after each reboot before using the VXI software.
- `resman` is the National Instruments multiframe Resource Manager. Run this program after `vxiiinit`.
- `victext` is the text-based interactive control program that executes functions you enter from the keyboard. It helps you learn the functions, program your VXI device, and develop and debug your application program. This program is described in detail in the *NI-VXI Text Utilities Reference Manual*.
- `vxitedit` is the text-based VXI Resource Editor program you use to edit system and device information. You can use this program to configure the system, edit the manufacturer name and ID association, and edit the information about the model names of VXI and non-VXI devices in the system, as well as the interrupt configuration information for the system. This program also displays the system configuration information devised by the Resource Manager. This program is described in detail in the *NI-VXI Text Utilities Reference Manual*.
- `nivxidd` is the NI-VXI device driver for AIX.
- `cvxi.c` is the NI-VXI C language interface for the NI-VXI device driver.
- `nivxi_add` and `nivxi_delete` are the shell scripts for installing and removing the NI-VXI device driver, respectively.

- `nivxi.stanza` is a file that describes configuration information about the MC-MXI.
- `cfgnivxi` is the configuration file used by the system while installing the driver.
- `readme.doc` describes the various files on the NI-VXI distribution diskette.

## Additional Programs and Files

The `/tbl` directory includes the following table files:

- `mfnameid.tbl` is a file that contains the global data base of the manufacturer names and their ID associations.
- `model.tbl` is a file that contains the global data base of the model names, manufacturer names, and the model codes associations.
- `device.tbl` is a file that contains the global data base of the device names, manufacturer names, model names, and frame and slot associations for the system.
- `nonvxi.tbl` is a file that contains the global data base for all non-VXI devices in the system.
- `intcfg.tbl` is a file that contains the system interrupt configuration information.
- `trigcfg.tbl` is a file that contains TTL trigger configuration editor information.
- `utilbus.tbl` is a file that contains the utility bus configuration editor information.
- `vxibus.cfg` is a file that contains the bus configuration information.
- `vxila.cfg` is a file that contains the logical address configuration information.
- `vxidev.cfg` is a file that contains the device configuration information.

The `/include` directory contains include files for the C language interface.

- `nivxi.h` is the main header file containing the C prototypes for the NI-VXI functions.
- `datasize.h` is a file that contains data size specifications.
- `busacc.h` is a file that contains parameter and return values for the bus access functions.
- `devinfo.h` is a file that contains parameter and return values for the device information and system configuration functions.
- `vxiiint.h` is a file that contains parameter and return values for the interrupt and signal functions.

- `sysint.h` is a file that contains parameter and return values for the system interrupt functions.
- `trig.h` is a file that contains parameter and return values for the trigger functions.
- `ws.h` is a file that contains parameter and return values for the Commander and Servant Word Serial functions.

The `/hlp` directory contains various help (`.hlp`) files used by `victext` and `vxitedit`.

The `/example` directory contains example programs showing you how to use the NI-VXI software.

## Installing the Software

Follow these procedures to install the NI-VXI software.

1. Log on as super-user (`root`).
2. Create a working directory (for example, `/usr/nivxi`) by entering the following command:

```
mkdir /usr/nivxi
```

3. Change to this working directory by entering the following command:

```
cd /usr/nivxi
```

4. Insert the NI-VXI distribution diskette and copy the files to this directory by entering:

```
tar xvf /dev/fd0
```

5. Compile the file `cvxi.c`. You can add `cvxi.o` to an existing library or include `cvxi.o` during the link phase of each compile operation.
6. If you want to run the NI-VXI utilities from any directory other than `/usr/nivxi`, set the environmental variable `NIVXIPATH` to the main directory containing the `/hlp` and `/tbl` subdirectories.

For example, if your main directory for the NI-VXI files is `/usr/nivxi`, use

```
set NIVXIPATH=/usr/nivxi
```

The NI-VXI utilities can then read the files from the `/usr/nivxi/tbl` and `/usr/nivxi/hlp` directories.

## Loading the NI-VXI AIX Driver

The NI-VXI AIX driver is a loadable driver. You do *not* need to go through the process of linking the driver with the kernel's object files, rebuilding the kernel, and restarting the system, as you would have to do with a non-loadable driver. Use the `nivxi_add` script file to load the NI-VXI driver.

Run the install script `nivxi_add` by typing the following command.

```
./nivxi_add x
```

where `x` is the slot number of your MC-MXI board.

If the hardware and the software are installed correctly, the following message appears on the screen.

```
nivxi0 available
```

## Unloading the Driver (Optional)

You can also unload the NI-VXI AIX driver from your system. To remove the NI-VXI driver, run the `nivxi_delete` script by entering:

```
./nivxi_delete nivxi0
```

If the driver was removed successfully, a message similar to the following will appear on the screen.

```
nivxi0 deleted
```

```
odmdelete: 4 objects deleted  
odmdelete: 1 objects deleted
```

## Configuring the MC-MXI Hardware

When the driver is installed, the Configuration Manager for AIX for RISC System/6000 automatically configures the hardware by assigning values for the base I/O address, slave memory size and offset, and interrupt and arbitration levels of the interface board according to the `nivxi.stanza` file. If there are any conflicts with the configuration information, the Configuration Manager flags the appropriate error messages. The following section describes the configuration information related to Shared Memory Access in the `nivxi.stanza` file.

## Shared Memory Access

It is possible to use RS/6000 memory as a shared memory resource so that the local RS/6000 masters as well as external MXIbus devices such as a VXIbus master in an external mainframe can have direct access to a segment of RS/6000 memory.

If you intend to use a VXIbus shared memory protocol that uses Micro Channel memory, you must select a shared memory base address (Micro Channel address). The shared memory base must be an even multiple of the shared memory size. The range for the shared memory base when the MC-MXI is an A16/A24 device is 0 to 15 MB, in increments of 1 MB. The range for shared memory base when the MC-MXI is an A16/A32 device is 0 to 3840 MB, in increments of 256 MB.

## Configuring the NI-VXI Software

Run the `vxitedit` device configuration utility if you need to make any changes to the default software configuration. You can also run `vxitedit` if you just want to examine the software configurations.

The following sections describe how to modify and/or view the configuration information for the MC-MXI board. To modify or view manufacturer names, model names, or device ID associations, or to obtain more information on non-VXI devices, refer to the *NI-VXI Text Utilities Reference Manual*.

### Default Configurations

The NI-VXI software has factory default configurations. These default configurations match the factory default configurations of the hardware interface.

If you do not use `vxitedit` to make changes, the default characteristics of the software will remain in effect.

### Using `vxitedit`

To run the `vxitedit` program, type `vxitedit`. Select the Configuration Editor from the main menu. The three configuration options available under the Configuration Editor are Logical Address Configuration, Bus Configuration, and Device Configuration. The Device Configuration option is not used. Do not modify the `vxidev.cfg` file, as it contains some system-dependent timer information used by the `vxiiinit` initialization program.

Type `help` to obtain online assistance within any editor, including determining which commands are applicable to the editor you are using. Type `save` to apply any changes you have made, and then type `exit`. If you want to exit without saving your changes, type `abort`. When you return to the main menu, you can enter another editor by selecting the number for that editor.

For further instructions on the use of the `vxitedit` program, refer to the *NI-VXI Text Utilities Reference Manual*.

The following sections describe the various configuration options available under the Logical Address and Bus Configuration Editors.

### Logical Address Configuration

Table 3-1 describes the characteristics of the options available under the Logical Address Configuration menu.

Table 3-1. Logical Address Configuration Characteristics

Characteristic	Description	Default Value
<b>Logical Address</b>	<p>An 8-bit number that uniquely identifies the MC-MXI. It can be configured as a static device with a logical address range from 0 through 254. If it is set to 0, it is the VXIbus Resource Manager. Logical Address 255 configures the MC-MXI as a dynamic device, as specified in the <i>VXIbus System Specification</i>.</p> <p>Range = 0 to 255</p>	0
<b>Device Type</b>	<p>Indicates the classification of the MC-MXI:</p> <p>0 = Memory                      1 = Extended                      2 = Message-Based                      3 = Register-Based</p>	2
<b>Address Space</b>	<p>Indicates the address spaces used by the MC-MXI:</p> <p>0 = A16/A24                      1 = A16/A32                      2 = Reserved                      3 = A16 only</p> <p>If you change the default value, also change the Slave Memory Base and Size (the width field) appropriately in the <code>nivxi.stanza</code> file.</p>	3

(continues)



Table 3-1. Logical Address Configuration Characteristics (Continued)

Characteristic	Description	Default Value
<b>Shared Memory Size</b>	<p>Indicates the size of VXI Shared RAM. The MC-MXI local RAM can be slave-accessed in either A24 or A32 space in D08, D16, and D32 data transfer modes.</p> <p>When the MC-MXI is an A16/A24 device, the possible values are as follows:</p> <p>1 MB, 2 MB, 4 MB, 8 MB</p> <p>When the MC-MXI is an A16/A32 device, the possible values are as follows:</p> <p>1 MB, 2 MB, 4 MB, 8 MB, 16 MB, 32 MB, 64 MB, 128 MB, 256 MB, 512 MB, 1024 MB, and 2048 MB</p> <p>Make sure that the Shared Memory Size is the same as the Shared Memory Size (the width field) in the <code>nivxi.stanza</code> file.</p>	4 MB
<b>Resource Manager Delay</b>	<p>Time in seconds to wait after power-up or reset before accessing any other VXIbus device's A16 configuration registers.</p> <p>Range = 0 to 0x7fffffff seconds</p>	5 seconds
<b>Servant Area Size</b>	<p>Servant area size is supplied when the MC-MXI receives the <i>Read Servant Area</i> command from the Resource Manager. The Servant area size is an 8-bit value (0 through 255) that indicates the MC-MXI Servant area. The Servant area begins at the logical address following the MC-MXI's logical address, and includes <i>N</i> contiguous logical addresses, where <i>N</i> is the value of the Servant area size.</p> <p>Range = 0 to 255</p>	0
<b>Protocol Register</b>	<p>Copy of the Protocol register, indicating which protocols the device supports. (Refer to the <i>VXIbus System Specification</i>.)</p>	0x0ff0

(continues)

Table 3-1. Logical Address Configuration Characteristics (Continued)

Characteristic	Description	Default Value
<b>Response for <i>Read Protocol Command</i></b>	The protocols that are supported, which are supplied when the MC-MXI receives the <i>Read Protocol</i> query from the Resource Manager. (Refer to the <i>VXIbus System Specification</i> .)	0x8448
<b>Number of Handlers</b>	The number of interrupt handlers that the application requires the MC-MXI to support (minimum of 1)  Range = 0 to 7	1
<b>Number of Interrupters</b>	The number of interrupters that the application requires the MC-MXI to support.  Range = 0 to 7	0

## Bus Configuration

Table 3-2 describes the characteristics of the options available under the Bus Configuration menu.

Table 3-2. Bus Configuration Characteristics

Characteristic	Description	Default Value
<b>MXIbus System Controller</b>	<p>A MXIbus link must have a single device that is responsible for MXIbus interrupt and bus arbitration as well as bus timeouts. This device is referred to as the MXIbus System Controller and is always the first device in the MXIbus daisy-chain. The MC-MXI is always designated as the MXIbus System Controller when used in this kit and should <i>not</i> be changed.</p> <p>0 = Not MXIbus System Controller 1 = MXIbus System Controller</p>	<p>1</p>
<b>MXIbus Fair Request</b>	<p>MXIbus fair requesters give all MXIbus devices equal opportunity to become bus masters and transfer data, regardless of their position within the MXIbus daisy-chain. MXIbus devices that are not fair requesters have a fixed priority scheme characterized by their relative position within the MXIbus daisy-chain. Devices closest to the MXIbus System Controller have the highest priority. The default configuration programs the MC-MXI to be an unfair requester and should only be changed if additional MXIbus devices are added to the system. Refer to the user manual included with your additional MXIbus devices for more information.</p> <p>0 = Not a MXIbus Fair Requester 1 = MXIbus Fair Requester</p>	<p>0</p>

## Exiting vxitedit and Reinitializing the Hardware

To exit `vxitedit`, type the number 11 when the main menu is displayed or type `exit`. If you changed any information, you are prompted to save your changes before exiting the menu. Saving the configuration information updates the configuration files `vxila.cfg` and `vxibus.cfg`. The `vxidev.cfg` file, which contains some system-dependent timer information used by the `vxiiinit` program, should not be modified. Run `vxiiinit.exe` to reinitialize the hardware according to the new settings.

If you changed any of the software configuration settings from the default settings, record the new settings on the *VXI-MC6000 Hardware and Software Configuration Form* in Appendix B.

## Developing Your Application Program

After you have verified that the driver software has been installed successfully, you can proceed with development of your VXI application software.

Use the VXI Text Interactive Control (`victext`) program to communicate with VXI devices through commands you enter at the keyboard. This feature helps you learn how to communicate with devices, troubleshoot problems, and develop your application.

The `victext` command set includes the same capability of NI-VXI function calls in addition to auxiliary commands that are unique to `victext`. You can use this utility to send data and Word Serial commands to devices from the keyboard and to display data received from devices on the screen. After each function executes, `victext` displays the device's response and the status.

The `victext` utility is designed to help you learn how to use the NI-VXI functions to program devices. Once you develop a sequence of steps that works successfully for your system, you can easily incorporate the sequence into an application program using the appropriate language and syntax.

The file `cvxi.c` interfaces between your C language application program and the operating system entry points to the VXI driver. The functions available in `cvxi.c` are described in detail in the *NI-VXI Software Reference Manual for C*. To use these functions, you must compile `cvxi.c` and include the resulting object file during the link phase of each application compile operation.

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

# Appendix A

## Specifications

---

This appendix lists various module specifications of the MC-MXI and VXI-MXI, such as physical dimensions and power requirements.

### MC-MXI

The following pages list the specifications for the MC-MXI module.

### Capability Codes

#### MXIbus

Capability Code	Description
MA32	Master Mode A32, A24 and A16 addressing
MBLT	Master Mode block transfers
SA32	Slave Mode A32, A24, and A16 addressing
SBLT	Slave Mode block transfers
MD32	Master Mode D32, D16, and D08 data sizes
SD32	Slave Mode D32, D16, and D08 data sizes
SC	Optional MXIbus System Controller
FAIR	Can be a fair MXIbus requester
LOCK	Can lock the MXIbus for indivisible transfers
TERM	Can terminate the MXIbus

**Micro Channel**

Capability Code	Description
MCMD32	Master D32, D16, and D08 data sizes
MCSD32	Slave D32, D16, and D08 data sizes
MCFAIR	Can be a fair Micro Channel requester
AM	Can function as an MC alternate master
LOCK	Can lock the Micro Channel for indivisible transfers
DMA32	Supports D32, D16 or D08 DMA transfers
INT	Can be a Micro Channel Interrupter

**Electrical**

Source	Typical	Direct Current (max)
+5 VDC	3.0 A	3.5 A

**Environmental**

Component Temperature	0° to 70° C (32° to 158° F) operating -55° to 150° C (-67° to 302° F) storage
Emissions	FCC Class A
Relative Humidity	0% to 95% noncondensing; operating 0% to 100% noncondensing; storage
Safety	Not applicable
Shock and Vibration	Not applicable

**Physical**

Board Size	Standard full-length Micro Channel board 29.21 mm by 8.82 mm (11.5 in. by 3.475 in.)
Connectors	Single fully implemented MXIbus connector

Slot Requirements                      Single 32-bit Micro Channel slot

## Reliability

MTBF                                      Contact Factory

## Requirements

Memory space required                64 KB or 32,832 KB

I/O space required                      4 KB

## Timing

### Master Mode

Transfer Type	Transfer Rate
Write	530 ns
Read	430 ns
Block Write	290 ns
Block Read	190 ns

### Slave Mode

Transfer Type	Transfer Rate
Write	340 ns
Read	440 ns
Block Write	310 ns
Block Read	360 ns

## Other

Daisy-Chain Delay                      120 ns  
(Passing GIN to GOUT or GOUT generation from System Controller)

## VXI-MXI

The following pages list the specifications for the VXI-MXI module.

### Capability Codes

#### VMEbus

Capability Code	Description
MA32, MA24, MA16	Master Mode A32, A24, and A16 addressing
SA32, SA24, SA16	Slave Mode A32, A24, and A16 addressing
MD32, MD16, MD08(EO)	Master Mode D32, D16, and D08 data sizes
SD32, SD16, SD08(EO)	Slave Mode D32, D16, and D08 data sizes
MBLOCK	Master Mode block transfers
SBLOCK	Slave Mode block transfers
MRMW	Master Mode Read/Modify/Write
SRMW	Slave Mode Read/Modify/Write
PRI	Prioritized arbitration
ROR	Release on Request bus requester
IH	Interrupt Handler
IR	Interrupt Requester
ROAK	Release on Acknowledge interrupter
BTO	Bus Timeout
SC	Optional VMEbus System Controller
IACK	IACK daisy-chain driver

#### VXIbus

Capability Code	Description
TRIG+1	Supports TTLTRIG0:7 and ECLTRIG0:1 trigger lines and full protocol operations for each. The VXI-MXI can participate in only one protocol operation at a time.



**MXIbus**

<b>Capability Code</b>	<b>Description</b>
MA32, MA24, MA16	Master Mode A32, A24, and A16 addressing
SA32, SA24, SA16	Slave Mode A32, A24, and A16 addressing
MD32, MD16, MD08(EO)	Master Mode D32, D16, and D08 data sizes
SD32, SD16, SD08(EO)	Slave Mode D32, D16, and D08 data sizes
MBLOCK	Master Mode block transfers
SBLOCK	Slave Mode block transfers
SC	Optional MXIbus System Controller
FAIR	Optional MXIbus fair requester
TERM	Can accept MXIbus termination resistors
IH	Interrupt Handler
IR	Interrupt Requester

**Electrical**

<b>Source</b>	<b>DC Current Ratings</b>		<b>Dynamic Current</b>
	<b>Typical</b>	<b>Maximum</b>	
+5 VDC	5.25 A	6.7 A	0.67 A
-5.2 VDC	300 mA	400 mA	50 mA
-2 VDC	100 mA	125 mA	20 mA

**Environmental**

Component temperature	0° to 70° C operating; -40° to 85° C storage
Airflow	3.5 liters/s for 10° rise
Relative humidity	10% to 90% noncondensing operating; 0% to 95% noncondensing storage
Emissions	FCC Class A

Safety Not applicable  
 Shock and Vibration Not applicable

**Physical**

Board size Fully shielded VXI C-size board  
 233.35 mm by 340 mm  
 (9.187 in. by 13.386 in.)

Connectors Single fully implemented MXIbus connector  
 Single INTX connector (on boards equipped  
 with optional INTX daughter card)

Slot Requirements Single VXI C-size slot

VXI Keying Class Class 1 TTL

Fully compatible with VXI specification

Fully enclosed and shielded

**Reliability**

MTBF Contact Factory

**Requirements**

A16 Space 64 B

**Timing**

**Master Mode**

Transfer Type	Transfer Rate
Write	675.5 ns
Read	625.5 ns
Block Write	320 ns
Block Read	270 ns

**Slave Mode**

Transfer Type	Transfer Rate
Write	381 ns
Read	381 ns
Block Write	238 ns
Block Read	238 ns

**Other**

Daisy-Chain Delay 120 ns  
 (Passing GIN to GOUT or GOUT generation from System Controller)

# Appendix B

## Customer Communication

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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

<b>Branch Offices</b>	<b>Phone Number</b>	<b>Fax Number</b>
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
Mexico	95 800 010 0793	95 800 010 0793
Netherlands	03480-33466	03480-30673
Norway	32-848400	32-848600
Singapore	2265886	2265887
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
Taiwan	02 377 1200	02 737 4644
U.K.	0635 523545	0635 523154

# Technical Support Form

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

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

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

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

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

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

Speed \_\_\_\_\_MHz RAM \_\_\_\_\_MB Display adapter \_\_\_\_\_

Mouse \_\_\_\_\_yes \_\_\_\_\_no Other adapters installed \_\_\_\_\_

Hard disk capacity \_\_\_\_\_MB Brand \_\_\_\_\_

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

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

Configuration \_\_\_\_\_

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

Configuration \_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

# VXI-MC6000 Hardware and Software Configuration Form

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

## National Instruments Products

- NI-VXI Software Revision Number: \_\_\_\_\_  
(Disk Label: *NI-VXI Distribution Diskette for MC-MXI for AIX*)
- Programming Language Interface Revision: \_\_\_\_\_
- MC-MXI Logical Address: \_\_\_\_\_
- MC-MXI Device Type: \_\_\_\_\_
- MC-MXI Address Space: \_\_\_\_\_
- MC-MXI Shared Memory Size: \_\_\_\_\_
- MC-MXI Shared Memory MC Base: \_\_\_\_\_
- MC-MXI Resource Manager Delay: \_\_\_\_\_
- MC-MXI Servant Area Size: \_\_\_\_\_
- MC-MXI Protocol Register: \_\_\_\_\_
- MC-MXI Response for Servant-Side  
Word Serial *Read Protocol* Query: \_\_\_\_\_
- Number of MC-MXI Handlers: \_\_\_\_\_
- Number of MC-MXI Interrupters: \_\_\_\_\_
- MC-MXI Base I/O Address: \_\_\_\_\_
- MC-MXI Interrupt Level(s): \_\_\_\_\_
- MC-MXI Arbitration Level(s): \_\_\_\_\_
- MXIbus (Fair) Controller?: \_\_\_\_\_
- VXI-MXI Installed in Slot 0?: \_\_\_\_\_
- VXI-MXI Slot Configuration:  
(S1, S8, W7, W9, and W10) \_\_\_\_\_
- VXI-MXI Logical Address: \_\_\_\_\_

- VXI-MXI VMEbus Request Level: \_\_\_\_\_
- MC-MXI Hardware Revision: \_\_\_\_\_
- VXI-MXI Hardware Revision: \_\_\_\_\_

## **Other Products**

- Computer Make and Model: \_\_\_\_\_
- Microprocessor: \_\_\_\_\_
- Clock Frequency (Bus and Microprocessor): \_\_\_\_\_
- Type of Video Board Installed: \_\_\_\_\_
- Programming Language Version: \_\_\_\_\_
- Other Boards in System: \_\_\_\_\_
- Base I/O Address of Other Boards: \_\_\_\_\_
- Arbitration Levels of Other Boards: \_\_\_\_\_
- Interrupt Level of Other Boards: \_\_\_\_\_
- VXIbus Mainframe Make and Model: \_\_\_\_\_
- Other VXIbus Devices in System: \_\_\_\_\_
- Static Logical Addresses of Other VXIbus Devices: \_\_\_\_\_

# Documentation Comment Form

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Title: **Getting Started with Your VXI-MC6000 and the NI-VXI™ Software for AIX**

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# Glossary

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Prefix	Meaning	Value
n-	nano-	$10^{-9}$
$\mu$ -	micro-	$10^{-6}$
m-	milli-	$10^{-3}$
k-	kilo-	$10^3$
M-	mega-	$10^6$
g-	giga-	$10^9$

## Symbols

°	degrees
%	percent
±	plus or minus

## A

A	amperes
A16 space	VXIbus address space equivalent to the VME 64 KB <i>short</i> 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 <i>standard</i> address space.
A32 space	VXIbus address space equivalent to the VME 4 GB <i>extended</i> address space.
address	Character code that identifies a specific location (or series of locations) in memory.
address modifier	One of six signals in the VMEbus specification used by VMEbus masters to indicate the address space in which a data transfer is to take place.



**address space** A set of  $2^n$  memory locations differentiated from other such sets in VXI/VMEbus systems by six addressing lines known as address modifiers.  $n$  is the number of address lines required to uniquely specify a byte location in a given space. Valid numbers for  $n$  are 16, 24, and 32. In VME/VXI, because there are six address modifiers, there are 64 possible address spaces.

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

**ANSI** American National Standards Institute

**arbitration** A process in which a MXIbus master gains control over the MXIbus.

## **B**

**backplane** An assembly, typically a printed circuit board, with 96-pin connectors and signal paths that bus the connector pins. A C-size VXIbus system will have two sets of bused connectors called J1 and J2. A D-size VXIbus system will have three sets of bused connectors called J1, J2, and J3.

**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. In VME, the data transfer may have no more than 256 elements; MXI does not have this restriction.

**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.

## **C**

**C** Celsius

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

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

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

## D

daisy-chain	A method of propagating signals along a bus, in which the devices are prioritized on the basis of their position on the bus.
Data Transfer Bus	DTB; one of four buses on the VMEbus backplane. The DTB is used by a bus master to transfer binary data between itself and a slave device.
DIP	Dual Inline Package
DTB	See <i>Data Transfer Bus</i> .
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
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
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**

GIN      Daisy-chain Grant In signal

GOUT      Daisy-chain Grant Out signal

GPIB      General Purpose Interface Bus; the industry-standard IEEE 488 bus.

## **H**

hex      Hexadecimal; the numbering system with base 16, using the digits 0 to 9 and letters A to F.

Hz      hertz; cycles per second.

## **I**

IC      Integrated Circuit

IEEE      Institute of Electrical and Electronics Engineers

in.      inches

I/O      input/output; the techniques, media, and devices used to achieve communication between machines and users.

interrupt      A means for a device to request service from another device.

interrupt handler      A VMEbus functional module that detects interrupt requests generated by Interrupters and responds to those requests by requesting status and identify information.

interrupt level      The relative priority at which a device can interrupt.

INTX      Interrupt Timing and Extension

**K**

KB 1,024; kilobytes of memory

**L**

LED Light Emitting Diode

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

**M**

MB 1,048,576; megabytes of memory

m meters

master A functional part of a MXI/VME/VXIbus device that initiates data transfers on the backplane. A transfer can be either a read or a write.

master-mode operation A device is in master mode if it is performing a bus cycle which it initiated.

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.

MTBF Mean Time Between Failure

MXIbus Multisystem eXtension Interface Bus; a high-performance communication link that interconnects devices using round, flexible cables.

MXIbus System Controller A functional module that has arbiter, daisy-chain driver, and MXIbus cycle timeout responsibility. Always the first device in the MXIbus daisy-chain.

**N**

NI-VXI The National Instruments bus interface software for VME/VXIbus systems.

Non-Slot 0 device A device configured for installation in any slot in a VXIbus mainframe other than Slot 0. Installing such a device into Slot 0 can damage the device, the VXIbus backplane, or both.

## P

propagation            The transmission of signal through a computer system.

## R

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

resman                 The name of the National Instruments Resource Manager in NI-VXI bus interface software. See *Resource Manager*.

Resource Manager      A Message-Based Commander located at Logical Address 0, which provides configuration management services such as address map configuration, Commander and Servant mappings, and self-test and diagnostic management.

RM                     See *Resource Manager*.

## S

s                        seconds

Servant                A device controlled by a Commander; there are Message-Based and Register-Based Servants.

Shared Memory Protocol    A communication protocol that uses a block of memory that is accessible to both a client and a server. The memory block operates as a message buffer for communications.

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

slave-mode operation    A device is in slave mode if it is responding to a bus cycle.

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

statically configured device    A device whose logical address cannot be set through software; that is, it is not dynamically configurable.

**T**

trigger Either TTL or ECL lines used for intermodule communication.

TTL Transistor-Transistor Logic

**V**

VDC volts direct current

victext Text-based VXI Interactive Control Program, a part of the NI-VXI bus interface software package. Used to program VXI devices, and develop and debug VXI application programs.

VME Versa Module Eurocard or IEEE 1014

VMEbus System Controller See *Slot 0 Device*.

VXIbus VMEbus Extensions for Instrumentation

vxiiinit A program in the NI-VXI bus interface software package that initializes the board interrupts, shared RAM, VXI register configurations, and bus configurations. This program must be run at least once after rebooting your machine to initialize the system.

vxitedit Text-based VXI Resource Editor program, a part of the NI-VXI bus interface software package. Used to configure the system, edit the manufacturer name and ID numbers, edit the model names of VXI and non-VXI devices in the system, as well as the system interrupt configuration information, and display the system configuration information generated by the Resource Manager.

**W**

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.